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Animation Art

IN THE COMMERCIAL FILM

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IN THE COMMERCIAL FILM

ER L. Lovian

 Randall Publishing Corporation - New York

Animation Art

IN THE COMMERCIAL FILM

Eli L. Levitan



Reinhold Publishing Corporation • New York

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100	The Production Office

To Transfilm

*My sincere thanks to General Electric for permitting
me to use the material contained in these pages.*

*Most of the drawings in this book were used in the
production of a one-minute television commercial featuring
transistor radios.*

Eli L. Levitan

the first time that I have seen
the first time that I have seen
the first time that I have seen
the first time that I have seen
the first time that I have seen

THE END

Introduction

Animate (an'-i-mat). *v.t.* [L. *animatus*, past part. of *animare*, fr. *anima* breath, soul.]

1. To give natural life to; to make alive.
2. To give spirit or vigor to; to inspirit; also, to stimulate; rouse.
3. To impart an appearance of life to; as, to *animate* a cartoon.
4. To actuate; prompt.

Animated cartoon or drawing. A series of drawings with slight progressive changes, made and arranged to be photographed and projected like a motion picture.

These definitions from *Webster's New Collegiate Dictionary* state concisely what the word "animate" and what the term "animated cartoon" mean; but the reader is left in somewhat the same quandary as the animation-studio visitor, who, after being shown through the various departments, still had one last question, "Yes, but what makes them move?"

This book was planned to provide the answer to that question as well as to many others on the subject of animation. In order to accomplish this, the animation of a television commercial is carefully analyzed. A commercial was chosen for analysis because the techniques used in the production of animated commercials are much more varied than those used in theatrical animation.

A major problem in writing the book was how to present detailed information on isolated techniques and procedures without losing the thread of the story as a whole. It is my hope that this has been solved by the present organization of the material.

The production of a typical one-minute television commercial is outlined in the first section in order to give the reader an over-all concept of the procedure. Following chapters describe techniques and procedures in detail. In so far as possible, procedures have been taken up in the same sequence in which they would occur in actual production. However, because some phases of production overlap or occur simultaneously, it has been necessary to mention certain processes, along with appropriate terminol-

ogies, before their proper production sequence. Where this occurs, the subject is covered more fully in a later chapter. The last section analyzes the animation techniques used in an actual television commercial—a General Electric commercial advertising its transistor radios. Most of the illustrative material used throughout the book is from this GE commercial.

Although this book is intended to provide a clear, understandable description of each process necessary for the production of an animated film, some of the more technical phases have been mentioned only briefly in order to give more space to the technique of animation itself. For the animation technique, although considerably older than any other motion-picture technique, is the least understood and, perhaps, the most misunderstood.

Animation is capable of producing a variety of effects unobtainable in “live” motion-picture production and when used as a motion-picture technique for purposes other than entertainment, it is usually more effective than live film. Interest is sustained for longer periods of time, and a greater percentage of the film’s subject matter is retained by the viewer.

The impact and effectiveness of the animated film is acknowledged through its steadily increasing use by advertising agencies for commercial purposes, by industrial organizations for technical and training purposes and by educational institutions for teaching a great variety of subjects. Because of this increased use of animation as an all-purpose technique, production studios throughout the United States and Europe, and even in parts of the world usually thought of as remote, are on a constant alert for skilled personnel.

For the great number of artists and cartoonists who know of animation but not about it, these pages provide an opportunity to acquire the knowledge necessary for entering the animation industry. For professional film producers these pages offer a better understanding of the motion-picture technique called animation. And for those readers interested in the mechanics of all forms of motion-picture production, the information contained in these pages will be extremely useful as a basis for more advanced study of the technical processes involved in film production generally.

Part I

The Animated Film

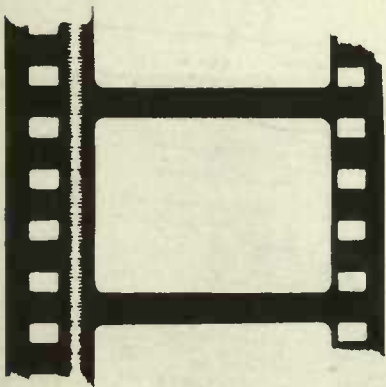
The purpose of this section is to give the reader an over-all picture of the production of an animated commercial. Starting with the story board, the procedures are outlined up to the point of the film's release to the television stations.

The Animated Film

A strip of processed motion-picture film consists of a series of pictures that have been exposed one at a time. Each exposure is called a *frame* of film. An illusion of movement is produced by the continuous projection of individual frames.

One blank frame of 35mm motion-picture film is shown here. You see 24 frames every second when watching a motion picture or a television commercial. During the course of a 60-second commercial, you see 1,440 individual pictures, or frames.

Many months of planning and preparation go into the production of 1,440 frames of film for a one-minute, "spot" commercial. A chain reaction is started when the client decides to use animated cartoons to advertise its product. Representatives of the client and the advertising agency come



*Blank frame of film
with sound track.*



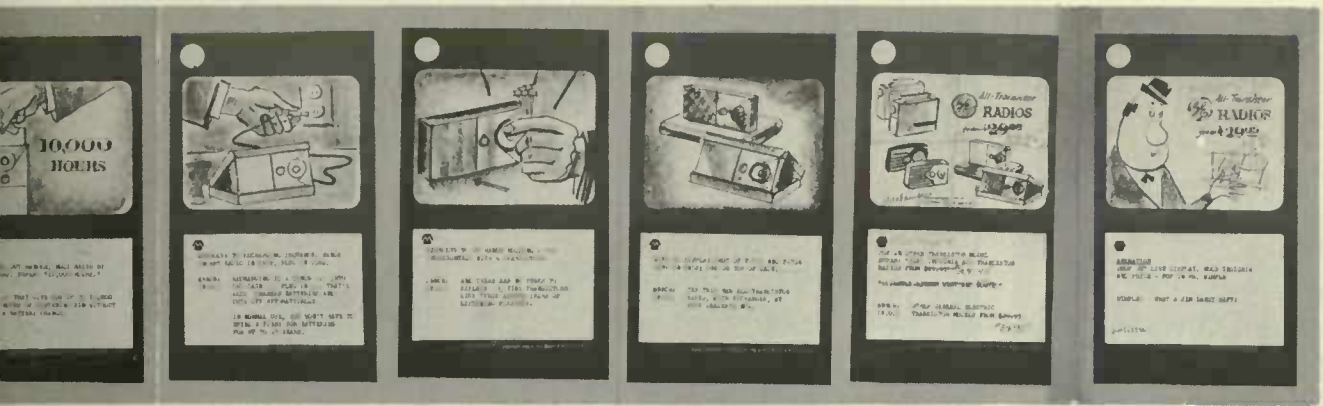
Reel of processed film.

THE ANIMATED FILM



Client: GENERAL ELECTRIC COMPANY - Radio Receiver Dept. Product: TRANSISTOR RADIO (P-700) Script No: 857-2 Dealer Network: Page 2 City:	
For use: Dealer Spot (Open end for Identification)	
VIDEO ON JIM'S RADIO AS THEY PICK UP RADIO OFF TABLE - ANOTHER TYPING BLANK. GIVE TYPING'S HAND TAKES RADIO FROM JIM'S HAND. THREE BACK TO US TYPING AND HAN, TYPING IS TYPING OUTTYPED, LEAVING HER OF HOUSE ON TYP. DISSOLVE TO DISPLAY OF ALL TRANSISTOR MODELS. TYPING "G.E. TRANSISTOR" ALL-TRANSISTOR RADIOS." (HOLD PICTURE TO 40 SEC.)	AUDIO ANNOUN: Compact and easy-handling with set 5 but 4 long-lasting transistors - on tubes to replace ever. Here's the portable that suits teenagers and travelers to a spot. MUSIC: RADIO MUSIC TO 40 SEC.

Client: GENERAL ELECTRIC COMPANY - Radio Receiver Dept. Product: TRANSISTOR RADIO (P-700) Script No: 857-2 Dealer Network: Page 2 City:	
For use: Dealer Spot (Open end for Identification) 12/5/56 vb	
VIDEO ANNOUN: (SINGS) "Home, home on the range ..." — need a little music out here. SOUND: SINGING, NOISE, BUSHED SOUND. ANNOUN: Oh, fiddle-sticks! Why hasn't somebody made a portable radio for the wide open spaces? ANNOUN: Somebody has, friend! And here it is — this new General Electric six-transistor portable that brings listening pleasure <u>close</u> everywhere you go! It's top-grade music can tell you this one is really made for outdoor life with power to spare wherever you need it. MUSIC: ESTABLISH IN D.C. - 30 SEC. TINY RADIO.	AUDIO ANNOUN: (SINGS) "Home, home on the range ..." — need a little music out here. SOUND: SINGING, NOISE, BUSHED SOUND. ANNOUN: Oh, fiddle-sticks! Why hasn't somebody made a portable radio for the wide open spaces? ANNOUN: Somebody has, friend! And here it is — this new General Electric six-transistor portable that brings listening pleasure <u>close</u> everywhere you go! It's top-grade music can tell you this one is really made for outdoor life with power to spare wherever you need it. MUSIC: ESTABLISH IN D.C. - 30 SEC. TINY RADIO.



together at a series of meetings to discuss their ideas and sift out the best ones for further development. Many ideas are discarded and much work is done and redone before they finally achieve a satisfactory *story board*, a series of cartoon panels similar to a comic strip.

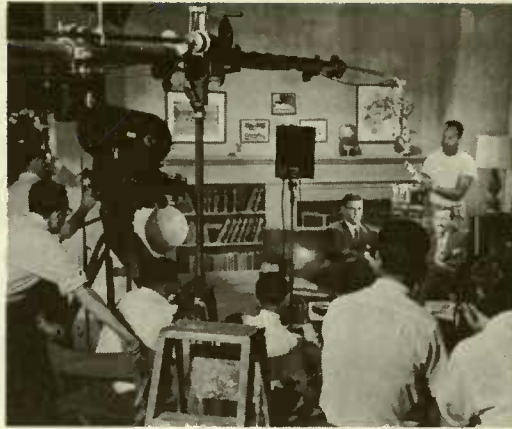
Further work on the story board and its accompanying script is done by the advertising agency. Then, after a final okay from the client, the agency sends out copies of the story board and script to several animation studios for competitive bids.

Immediately after the studio has been selected, its department heads meet with the advertising agency representatives to discuss the story board and to talk over anticipated problems. After the approach has been agreed upon, the animation studio begins production of the film.





Recording sound.



Shooting live action.

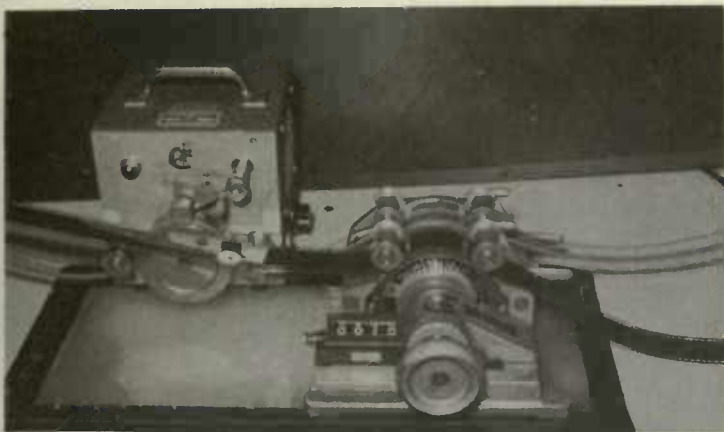


Viewing dailies.

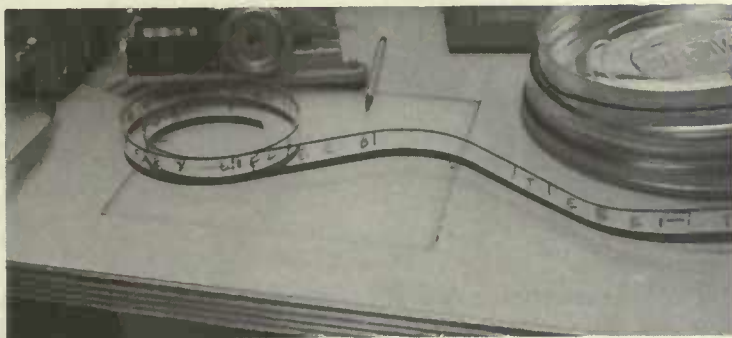
The first major step is to make the *sound track*. An actor is hired to create the cartoon character's voice and given a script to study. A recording studio is booked and the dialogue for the animated portions of the commercial as well as any musical background is recorded on tape. Several *takes* of the recording may be necessary before a final tape meets with everybody's approval. This approved tape is transferred to film. The result is called a magnetic sound track.

If there is a "live" spot in the commercial, the work on it has also begun. Since live actors act and talk at the same time, the action is filmed at the same time that the dialogue is recorded. When each day's shooting is finished, the film is sent to the laboratory for developing and printing. These *dailies*, sometimes called *rushes*, are usually reviewed the day after shooting by both ad agency and studio representatives. The good takes are selected and temporarily matched to the magnetic sound track. The result is known as the *rough-cut print*.

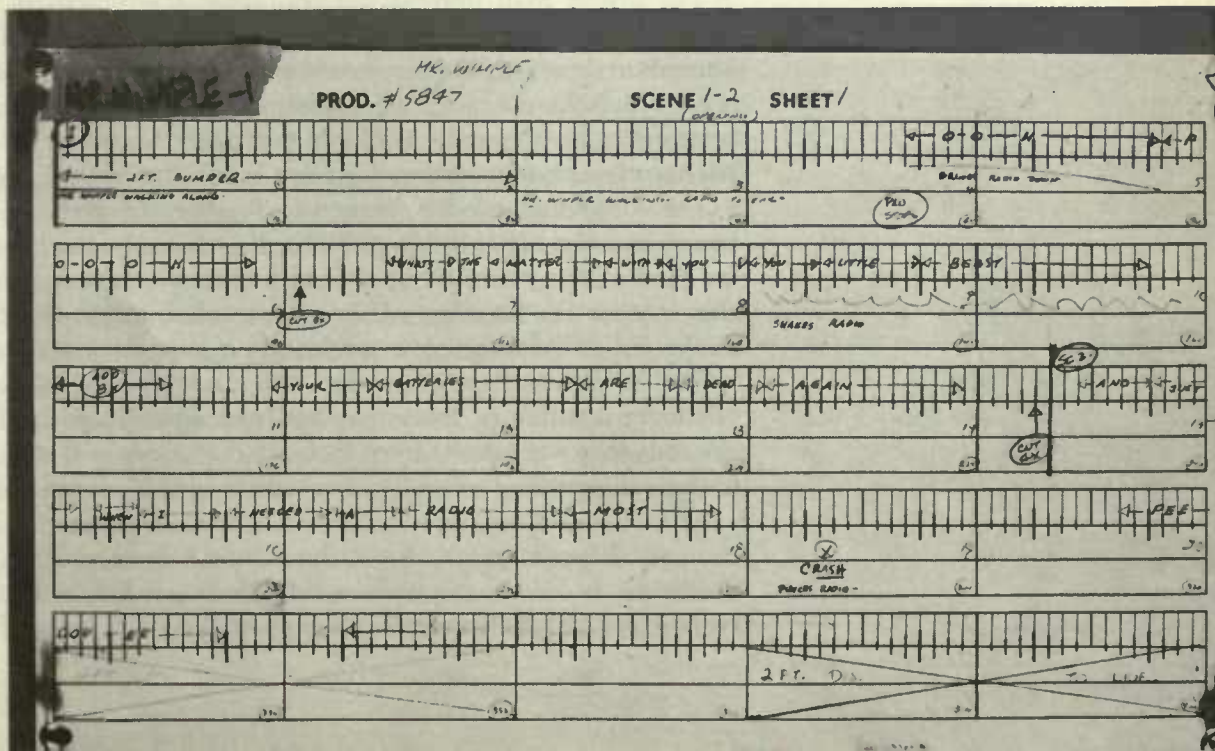
During this period, the animation department has continued its work. The sound has already been recorded and transferred to film and the director of animation and the film editor have picked out the portion of the sound track to be used with the animated section of the commercial. The film editor now carefully analyzes the sound track by running it through a device known as a *sound reader*. In the blank areas of the film, the editor writes the exact dialogue as it has been recorded, breaks up words into syllables, and makes note of musical accents and beats. He then runs the marked-up sound track through a *synchronizer*, which measures the exact film length of each word, syllable and musical phrase and beat. This information is then given to the animation director who prepares *bar*, or *lead*, sheets. Each frame of the entire commercial is accounted for on these sheets, live action included.



Sound reader and synchronizer.



*Phonetic record of the dialogue
written on the clear area of film.*



Bar sheet.



The background artist.



The animator.



The inbetweenner.

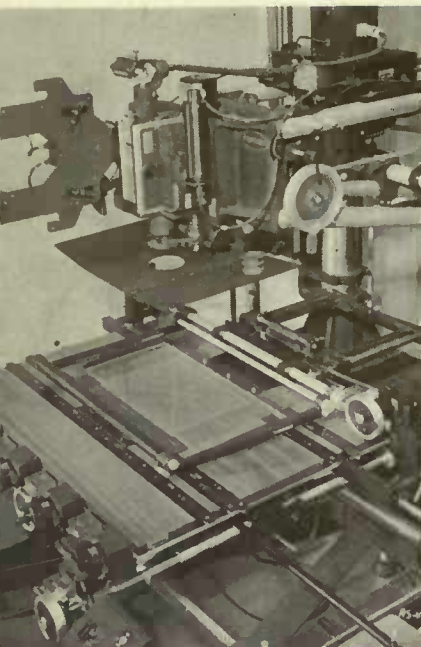
In the meantime, the director and the layout man have discussed the cartoon character to be animated and have decided on a suitable personality in keeping with the recorded voice on the sound track. Backgrounds and other story-board requirements, such as a simplified design for the real "hero" of the commercial, the product to be advertised, have also been discussed.

The layout man designs the character, the proposed backgrounds and the product, and then submits many rough sketches of his designs to the animation director. The director makes his selection on the basis of the ease with which the character can be animated and its acceptance as the logical personality for the voice on the sound track. Now that basic decisions have been made, the animation production line swings into high gear.

The animator and the background artist are given copies of the story board and the approved layouts for the character and the backgrounds to be used in the commercial. Because their work is so closely interrelated, they discuss the handling of the cartoon character and the treatment of the backgrounds before going to work at their respective drawing boards.

The background artist renders the backgrounds, using water colors or whatever medium or treatment has been agreed upon. (I have seen backgrounds that were made from Chinese rice paper and others that were built in three dimensions for multiplane setups; but this is not common.)

At the same time, the animator has been drawing the cartoon character in many different poses. When the animator feels entirely familiar with the character, he draws the basic action for the scene on which he is working while constantly referring to his copy of the story board. However, he does



Animation stand.

in the entire scene are consistent and that no mistakes have been made. He also makes certain that no cels or backgrounds are missing before sending the scene on to the camera department.

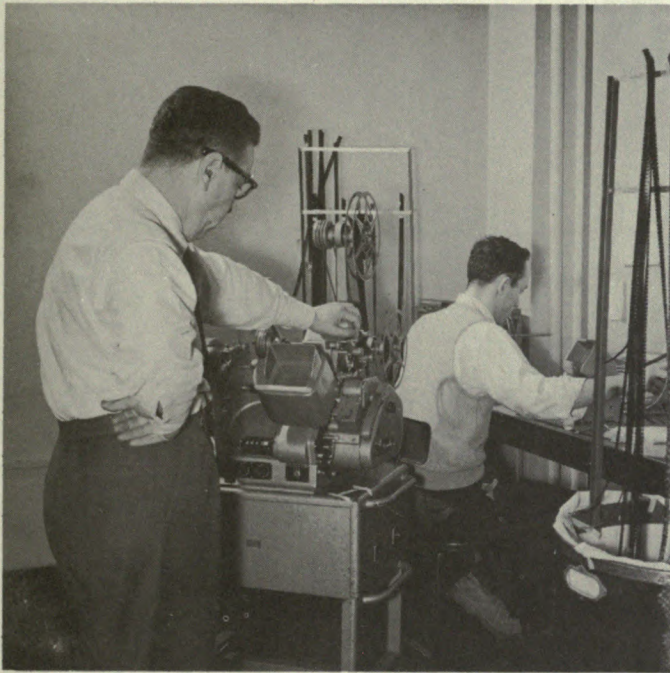
Upon receipt of the finished art work, the animation cameraman places each cel over the background in the sequence called for by the animator and photographs them, one at a time, using specially designed animation cameras. The exposed film is then sent to the laboratory for developing and printing.

After processing, the film is returned to the film editor. Using the information on the bar sheets described earlier, the film editor and the animation director synchronize the animation to the sound track by using a *moviola*, which can run both reels at the same time.

This rough cut of the live action and animation portions is screened for the client, ad agency and studio personnel. If titles or other effects are to be added, a duplicate print, known as a *fine grain*, is given to the optical cameraman. He will add the required effects by using the versatile *optical printer*, a camera that photographs film instead of art work, and which is capable of producing many special effects, such as fades, flips, repeats, and multiple-image shots; it can also copy more than one strip of film at a time—almost any effect desired can be achieved through its use.

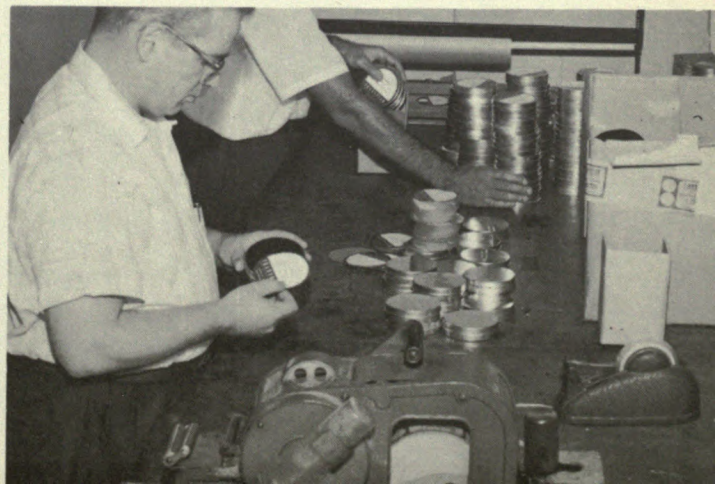
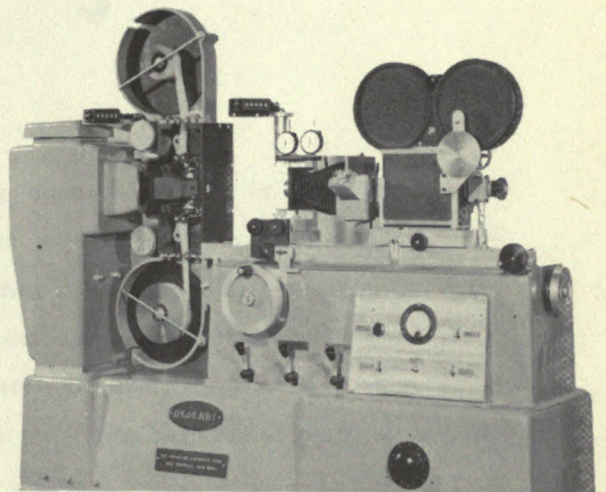
After the optical cameraman has added titles and any other effects requested, the processed result is synchronized with the sound track and screened once more. If this *answer print* is deemed satisfactory, the animation film and sound track are sent back to the laboratory to be combined into a *composite print*.

After many months' work, the animated film is now finished. Composite prints are sent to the TV stations in time to meet a previously established deadline and home audiences are shown the finished commercial.



Moviola.

Optical printer.



Packing release films for distribution.

Part II

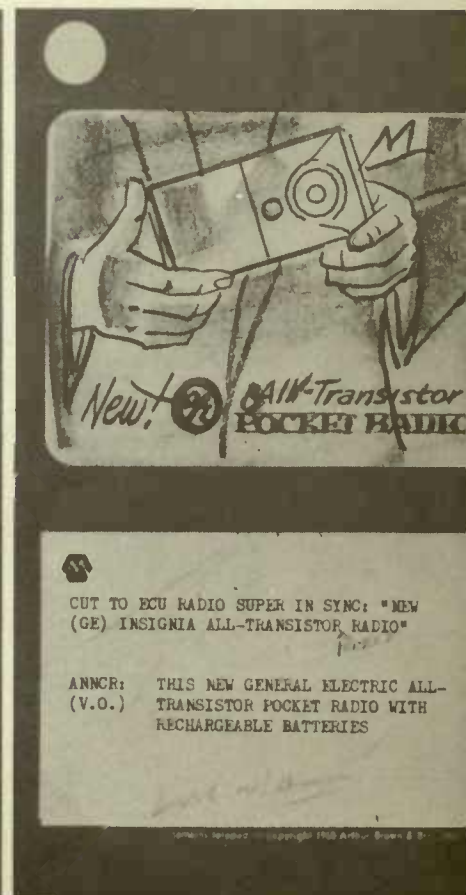
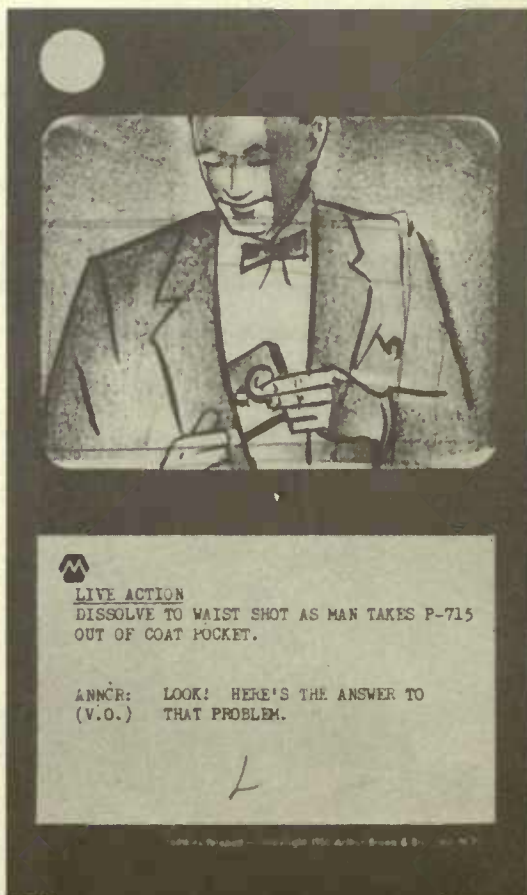
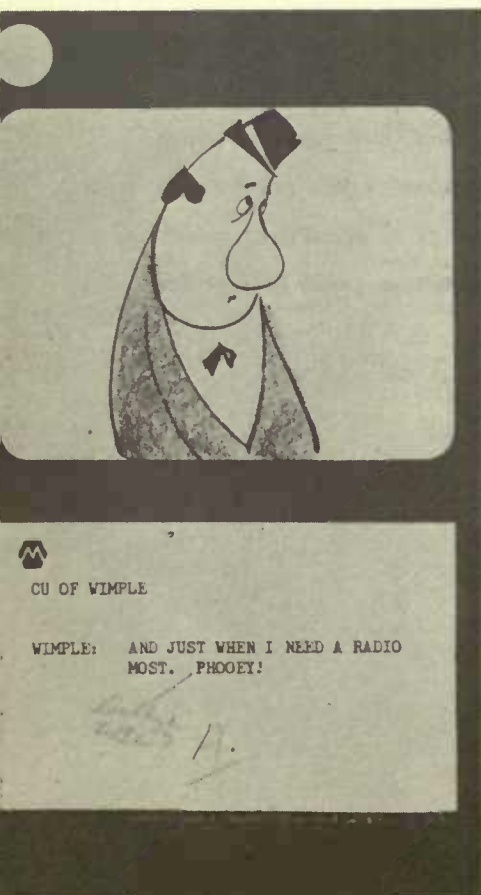
Planning

Planning an animated film is, in many ways, more important than any process that follows. For it is in the planning stage that the policy governing the entire production is established. Mistakes at this point result in additional costs for every stage of production, which can make the difference between a profit or loss for the animation studio.

The Story Board

The *story board* is a series of drawings, not unlike a comic strip, arranged in a sequence to illustrate a story or situation. The applicable narration or dialogue is usually written or typed under each drawing.

Some story boards consist of rather crude drawings, intended to convey an idea rather than display any artistic merit. Other story boards are more finely drawn, with details sharply indicated, to show exactly what is expected in the finished commercial. Although most story boards are supplied by the

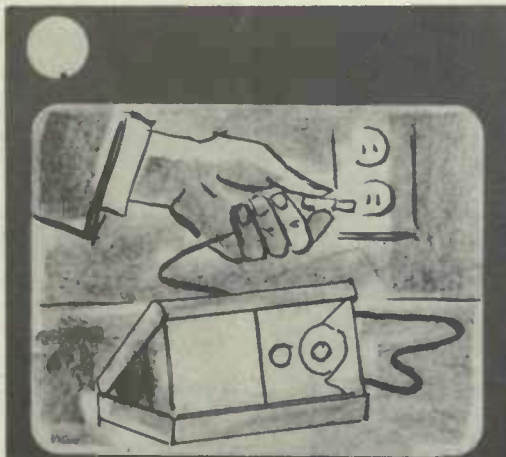


client or its ad agency, the animation studio may sometimes be asked to originate the ideas and drawings.

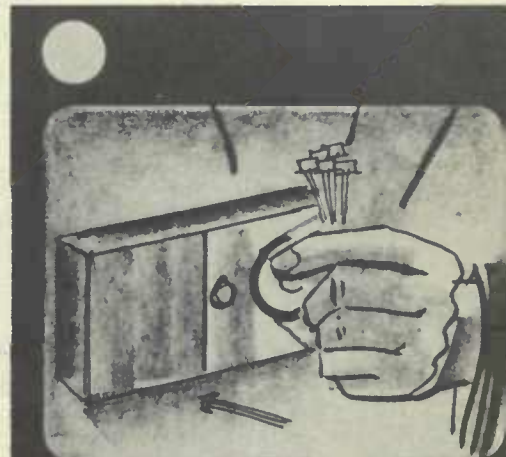
Shown here is part of the story board used in the production of the television commercial discussed in Part V. If you study this story board, you will find that the client and its advertising agency have carefully indicated the "sales pitch" and other basic principles of advertising although they have only roughly indicated the style to be followed in drawing the cartoon character.



M
HANDS PULL OUT HANDLE, HOLD RADIO BY TWO FINGERS. SUPER: "10,000 HOURS."
ANNCR: — THAT GIVE YOU UP TO 10,000 (V.O.) HOURS OF LISTENING FUN WITHOUT A BATTERY CHANGE.



M
DISSOLVE TO RECHARGING SEQUENCE. HANDS INSERT RADIO IN CASE, PLUG IN CORD.
ANNCR: RECHARGING IS A CINCHE ... INTO THE CASE ... PLUG IN ... THAT'S ALL! CHARGES BATTERIES AND CUTS OFF AUTOMATICALLY.
IN NORMAL USE, YOU WON'T HAVE TO SPEND A PENNY FOR BATTERIES FOR UP TO 13 YEARS.



M
DISSOLVE TO CU HANDS HOLDING P-715 (HORIZONTAL) WITH 6 TRANSISTORS.
ANNCR: AND THERE ARE NO TUBES TO REPLACE — 6 TINY TRANSISTORS LIKE THESE ASSURE YEARS OF LISTENING PLEASURE.

Film and the Editor

The sound reader, synchronizer, and moviola are the tools used by the film editor to ensure the quality and precision usually found in a television commercial.

The first of these tools, the *sound reader*, is used by the editor in analyzing the sound track. The sound reader consists of a small, metal housing with a round wheel over which the film to be analyzed passes. The housing also contains a light beam that is directed at the sound portion of the film. The film can be wound in either direction over the wheel at any speed desired by the editor. In this way, it is possible to pick out high and low tones and accents, and to break words into syllables. As the sound-track film travels over the wheel and into the *synchronizer*, the synchronizer measures the film in frames and feet. These exact measurements and the film editor's analysis enable the animator to time the animation, the cartoon character's movements and mouth actions, to the twenty-fourth of a second—the length of time each frame of film is visible when projected. In the photograph shown here, the other piece of film passing through the synchronizer is the picture portion or work print.

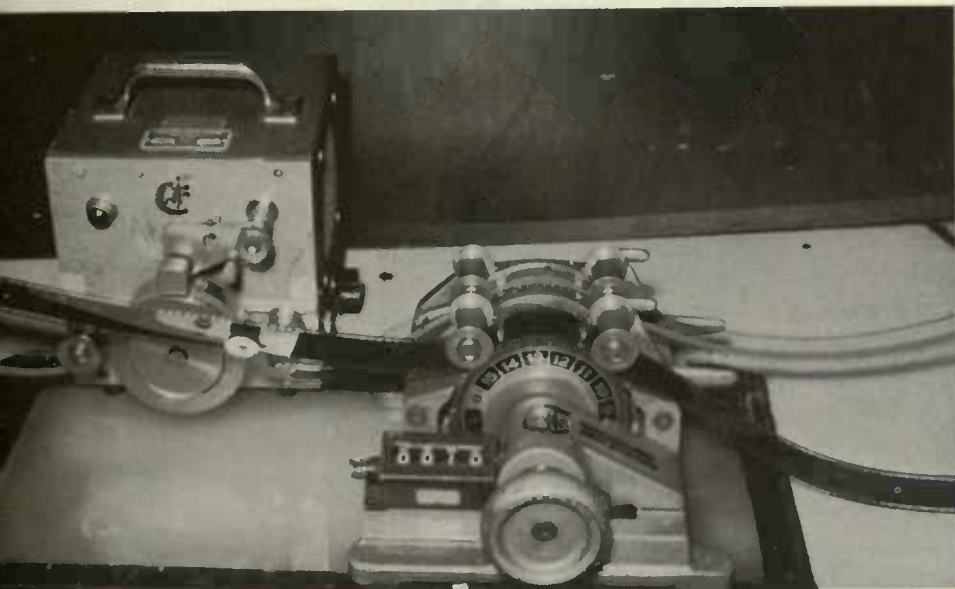
Another tool used by the film editor is the *moviola*. The moviola can run both the picture reel and the sound-track reel at the same time. By coupling the two reels, the film editor and the animation director can determine immediately how well the two reels synchronize. They then can advance either the sound track or the picture reel by the number of frames necessary to get a better sync. Perfect synchronization is achieved only after the picture and the sound track have been run together many times.

The process whereby the picture reel and the sound track are run and projected at the same time is called the *interlock*. The *rough-cut print*, which consists of the good takes of the live action and animation spliced together by the film editor in their proper order but not necessarily to the exact length, is used for this projection.

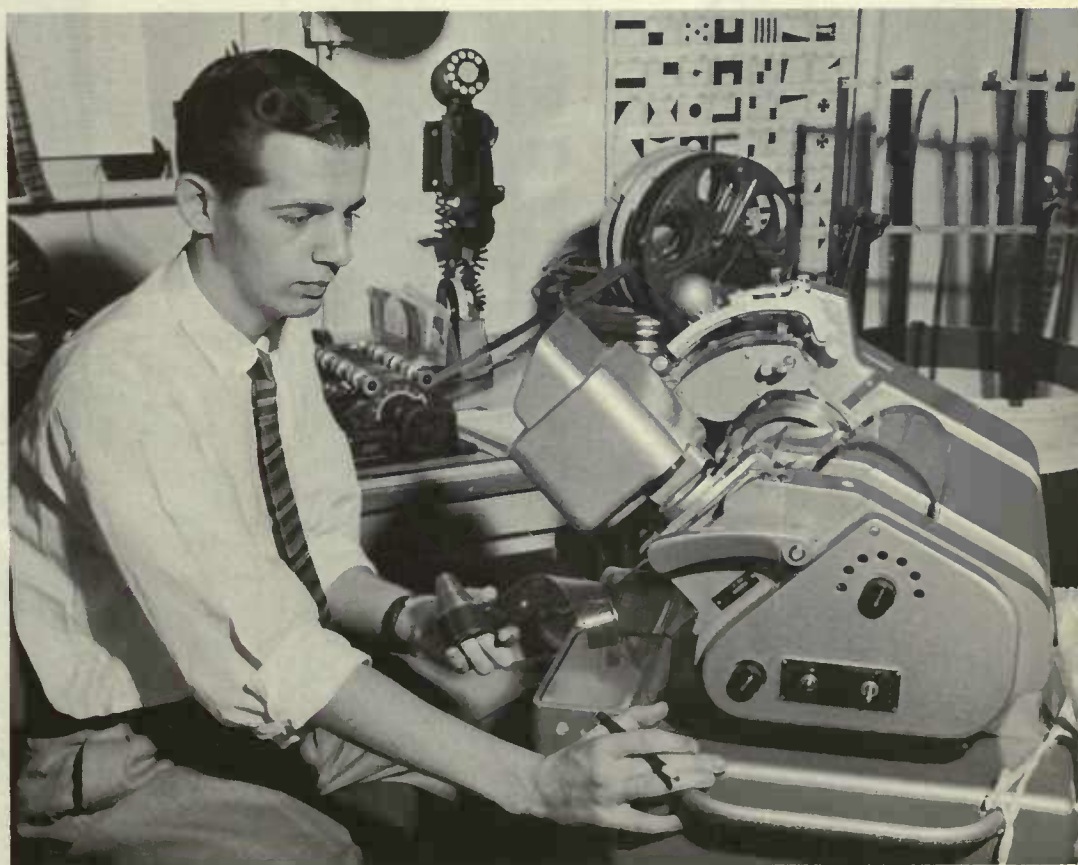
During the course of production, many other prints are used. They are as follows:

The *work print*, as the name implies, is the print used during production. Both the visual portion and the sound track are cut to the actual lengths to be used in the completed production.

The *optical print* is the first combination of animation and live sequences

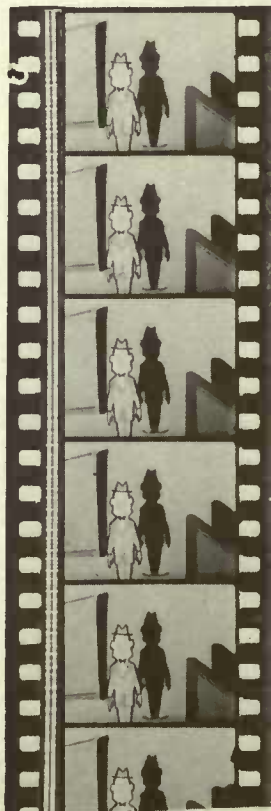
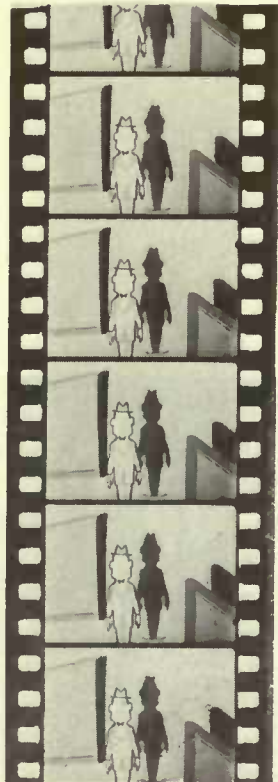


Sound reader (left) and synchronizer.



Film editor using a moviola. The chart on the wall shows the symbols used for indicating wipes and other optical effects. To the right is a film barrel, the film editor's filing cabinet.

*Strips of 35mm and 16mm film. Note the difference in frame size.
The dotted tapes on the two composite prints are sound tracks.*



with special effects. It is used to check the continuity of the filmed picture against the story board as well as to check the temporary synchronization of the picture and the sound track.

The *composite print*, also known as the *release print*, contains both the picture portion and the sound track on the same piece of film. It is the finished print that is released to television stations or theatres for showing to their audiences.

Film Conversion Table

Film travels through a projector at the rate of 24 frames each second. This is true of both 35mm and 16mm film even though they differ in film size. For example, although a strip of 35mm film containing 1,440 frames is 90 feet long and a strip of 16mm film containing the same number of frames is only 36 feet long, either strip would be projected in the same length of time, one minute, because the film-projection rate is based on frames, not on footage.

The table below shows: 1) The number of frames per foot for each film size and the comparable footage projected in one minute; 2) comparable footage projected for each film during periods ranging from $\frac{1}{2}$ second to 10 minutes.

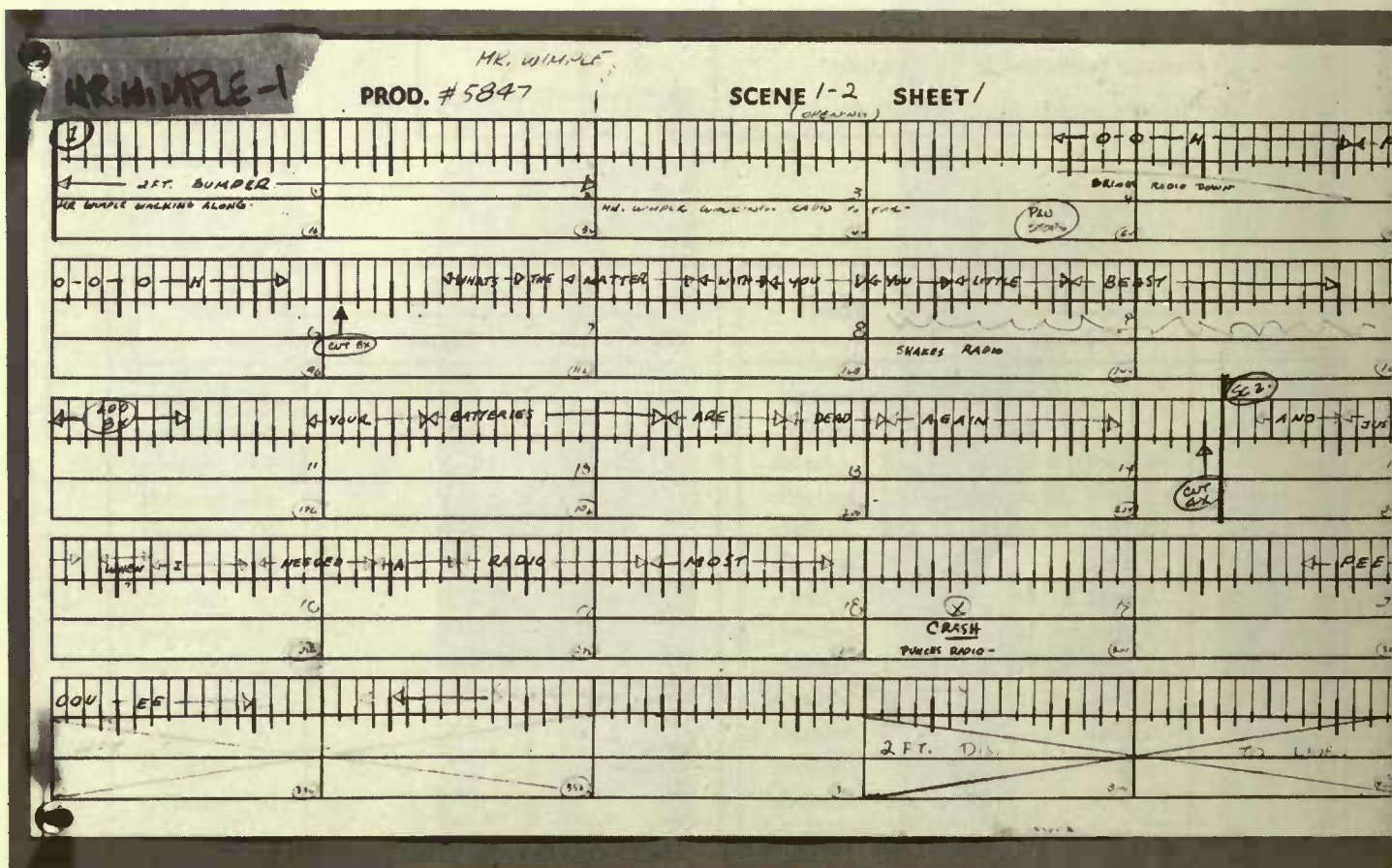
	Film	
	35 mm	16 mm
No. of frames per foot of film	16	40
Film footage projected in one minute	90	36
No. of frames projected in one minute	1,440	1,440

Film Projected		Time	Film Projected		Time
35 mm	16 mm		35 mm	16 mm	
$\frac{3}{4}$ foot	12 frames	$\frac{1}{2}$ second	45 feet	18 feet	30 seconds
1 $\frac{1}{2}$ feet	24 frames	1 second	52 $\frac{1}{2}$ feet	21 feet	35 seconds
3 feet	1 foot 8 frames	2 seconds	60 feet	24 feet	40 seconds
4 $\frac{1}{2}$ feet	1 foot 32 frames	3 seconds	67 $\frac{1}{2}$ feet	27 feet	45 seconds
6 feet	2 feet 16 frames	4 seconds	75 feet	30 feet	50 seconds
7 $\frac{1}{2}$ feet	3 feet	5 seconds	82 $\frac{1}{2}$ feet	33 feet	55 seconds
9 feet	3 feet 24 frames	6 seconds	90 feet	36 feet	1 minute
10 $\frac{1}{2}$ feet	4 feet 8 frames	7 seconds	135 feet	54 feet	1 $\frac{1}{2}$ minutes
12 feet	4 feet 32 frames	8 seconds	180 feet	72 feet	2 minutes
13 $\frac{1}{2}$ feet	5 feet 16 frames	9 seconds	270 feet	108 feet	3 minutes
15 feet	6 feet	10 seconds	315 feet	126 feet	4 minutes
22 $\frac{1}{2}$ feet	9 feet	15 seconds	360 feet	144 feet	5 minutes
30 feet	12 feet	20 seconds	900 feet	360 feet	10 minutes
37 $\frac{1}{2}$ feet	15 feet	25 seconds			

Bar Sheets

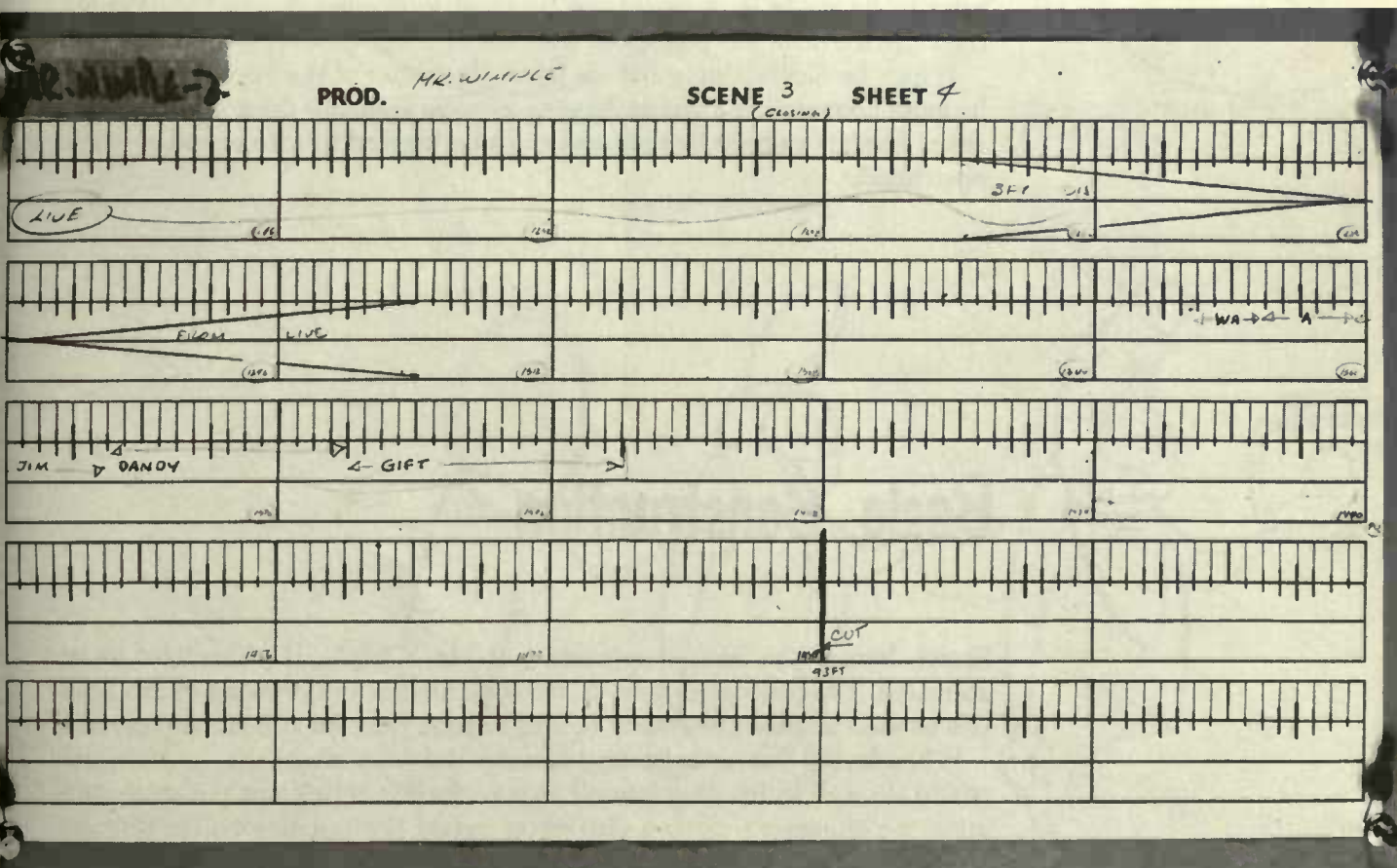
After the film editor has analyzed and timed the sound track, the animation director makes out *bar* sheets—a complete visual synopsis of the entire production—to be used as a guide by the animator and the film editor. Each line on a bar sheet, also referred to as a *lead* sheet, represents a frame of film, or a twenty-fourth of a second. Each box represents a foot of film.

Bar sheets show, in terms of single frames of film, the exact length of each syllable in each word of the dialogue in the animated portion of the commercial; they also show exactly how many frames of film a word is to occupy so that the animator can draw the action to fit.



When the animation director has accounted for the content of each frame, the bar sheets indicate the entire action described in the story board. The animator is always guided by the frame count. He cannot, for example, use 100 frames to animate a scene or action if the dialogue for that scene takes only 60 frames of film.

Sound effects, musical beats, and optical or camera effects are also indicated on the bar sheets, as are live-action sequences. However, for the live action, the director simply writes "live" on the bar sheet; obviously, no sound-track analysis is necessary for live actors.



Cartoon Characters

Cartoon characters are basically caricatures of real people with whom we come in daily contact—fat people, thin people, tall people and short people, each with individual characteristics. One word suffices to cover the general categories, *types*.

Before attempting to interpret a character from the sound of his voice, a layout man should listen to the sound track many times—always with his eyes closed and his imagination open. This will help him to visualize and then draw a cartoon character that fits the voice on the sound track. The result will be a good combination of sight and sound.

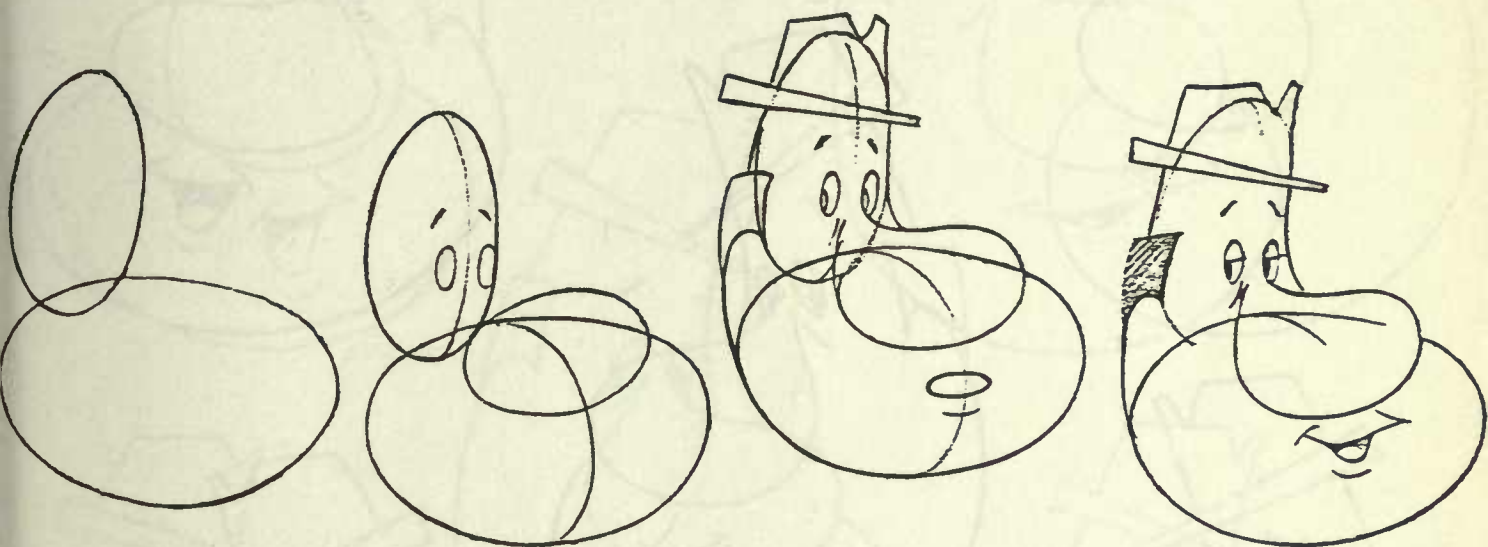
The voice of our cartoon character, Mr. Wimple, used as the example throughout this book, is that of a well-known radio and television actor whom the animator may have seen. But if the animator drew a caricature of the actor as he really is, it would not be at all in character with Mr. Wimple, the voice the actor has projected.

It may be disillusioning but we know the owner of the Popeye voice, and he looks no more like Popeye than the average animator does. Therefore, we again strongly suggest that a sound track be listened to with closed eyes and open mind.

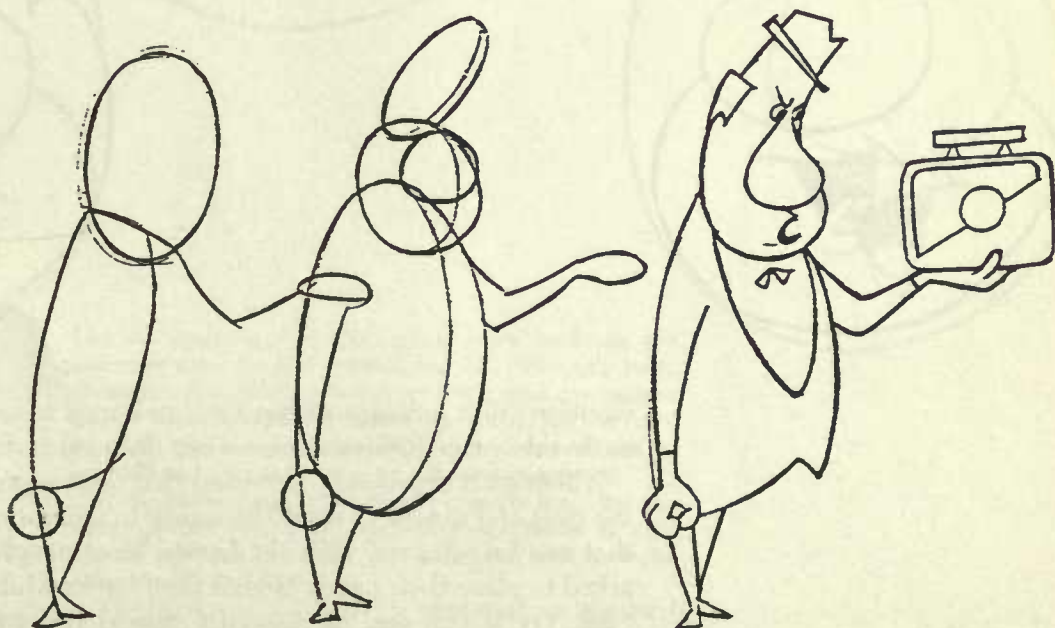
Basic Construction

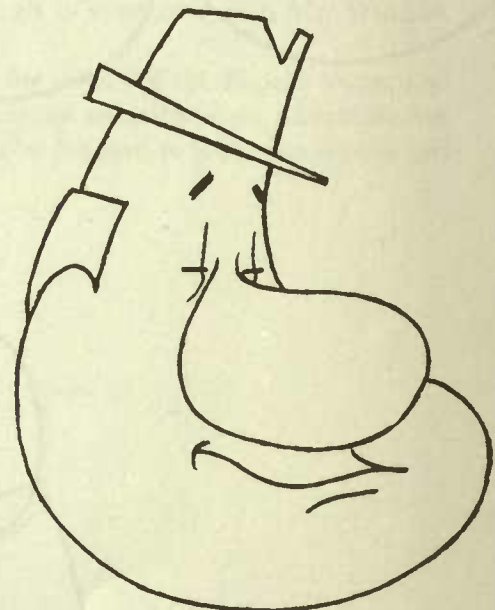
Shown here is the basic construction of Mr. Wimple, the character to be animated. The two circles used in the construction and drawing of the head can be used to draw almost any type of cartoon head for animation purposes.

When laying out or animating cartoon-character situations, an animator would do well to imagine himself as a performer acting out the same situation. An animator's cartoon characters cannot portray an emotion through facial expressions unless the animator himself is capable of portraying that



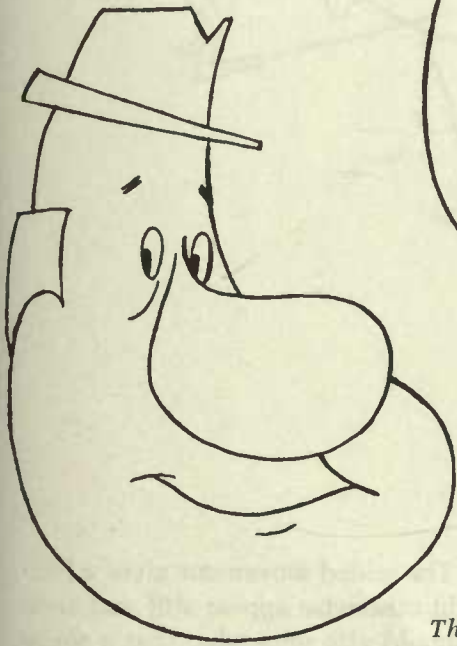
Construction drawings.





emotion. Most animators keep a mirror handy to study their own expressions so that they can duplicate them when drawing cartoon characters.

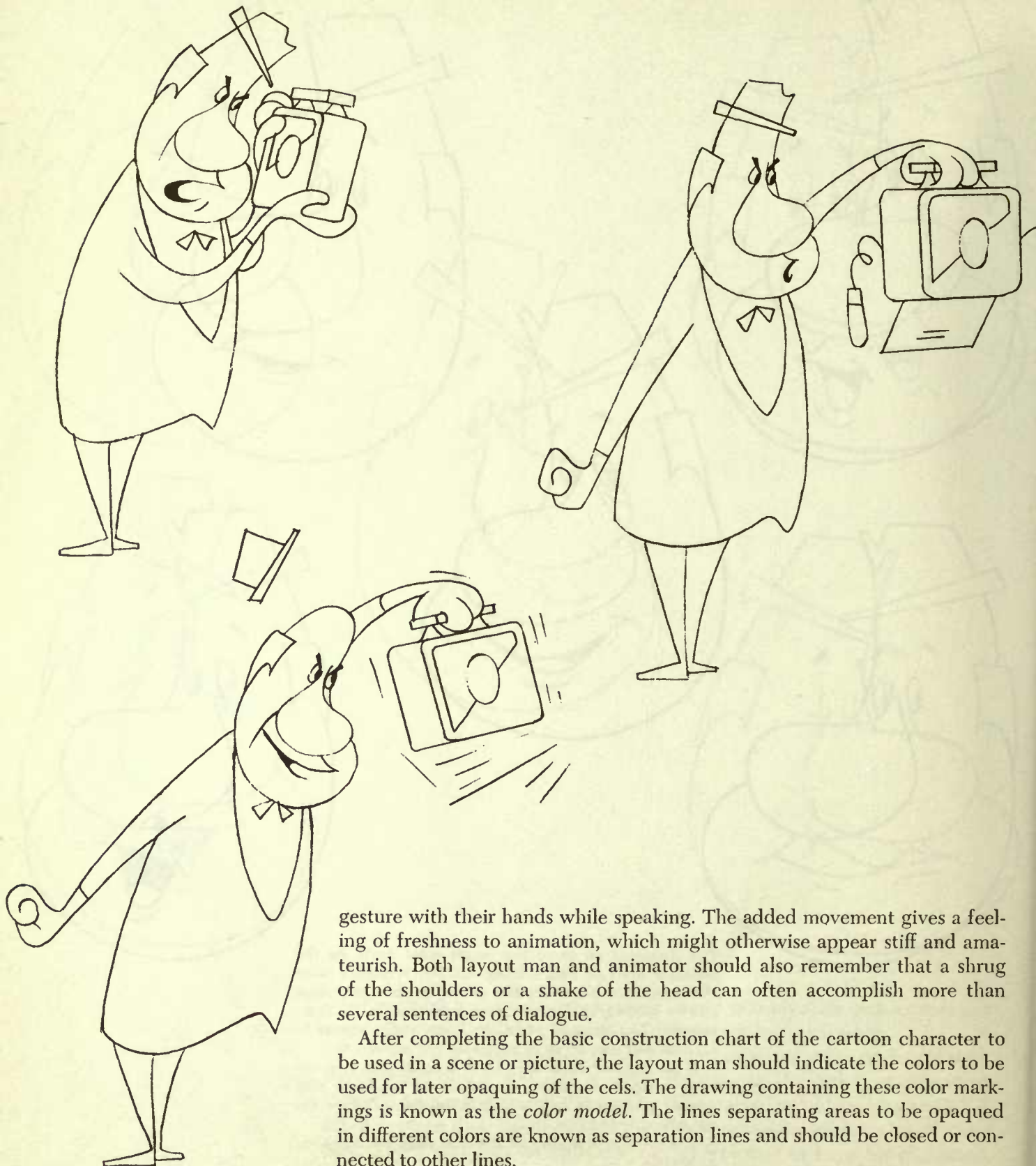
Although it is generally accepted that most expressions are portrayed with the eyes and mouth, it would be unfair to minimize the variety of expression that can be achieved with the hands. Most people would be tongue-tied if asked to place their hands behind their backs while describing a spiral staircase. Try it and see. An animator should feel free to have his characters



The drawings on these two pages were made by the animator after he had worked out Mr. Wimple's basic characteristics. These studies of key facial expressions will be used by studio personnel as models for the commercial. The animator, himself, keeps them pinned to his wall and uses them as guides during animation.

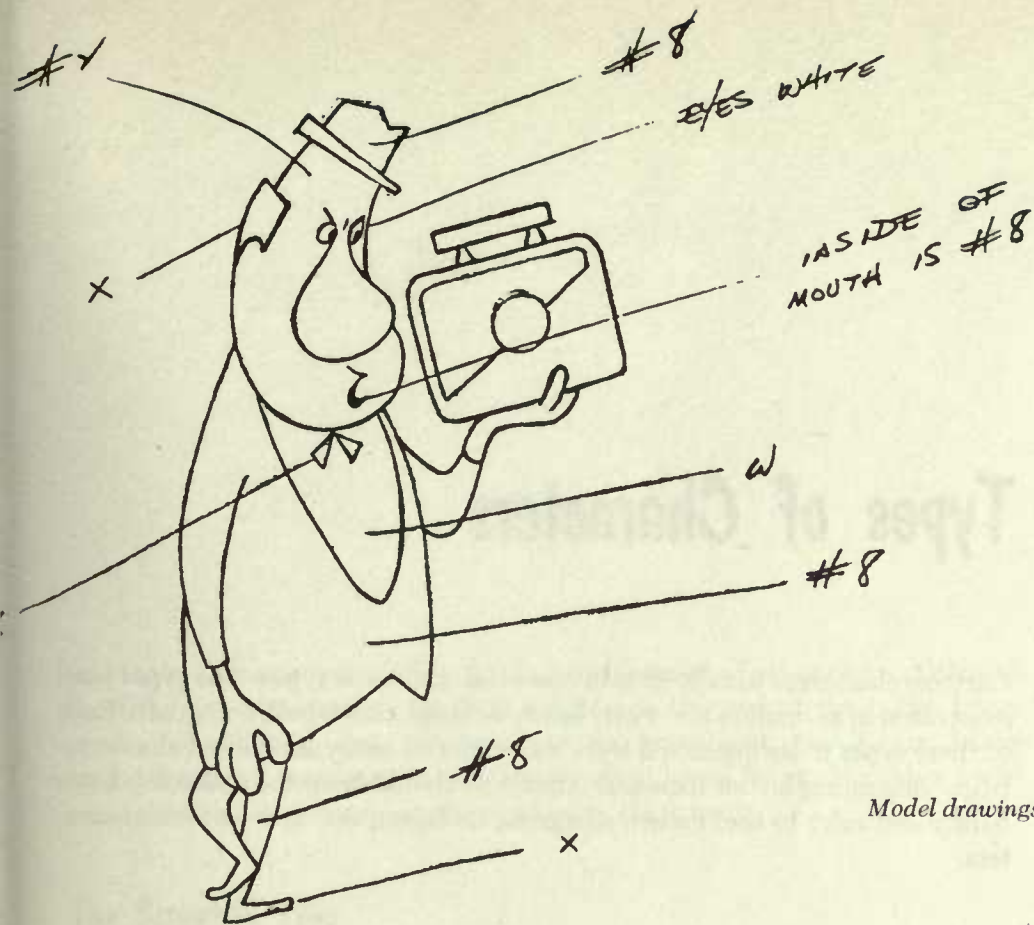
If the commercial is the first of a series featuring the same cartoon character, photostats are made so that anyone who works on the later animation will have the same models to follow.

The full-figure studies on the next page are also used as models.

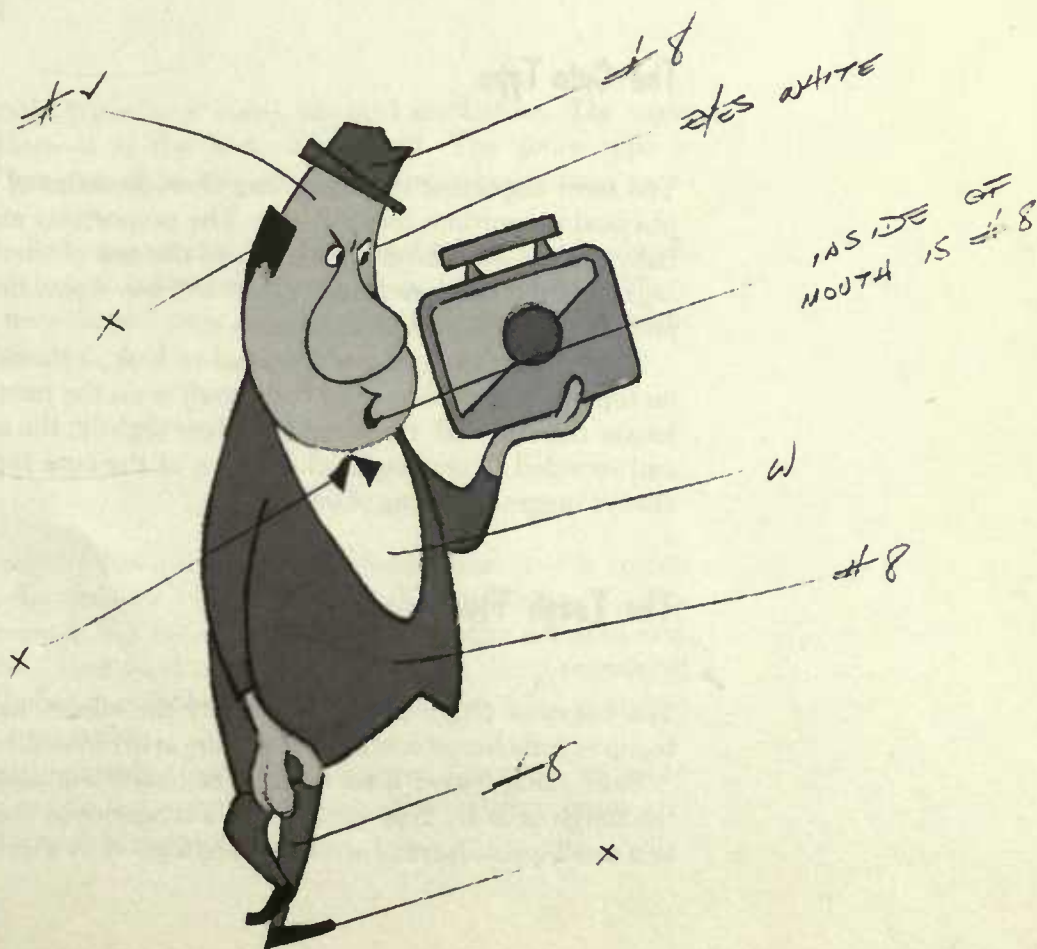


gesture with their hands while speaking. The added movement gives a feeling of freshness to animation, which might otherwise appear stiff and amateurish. Both layout man and animator should also remember that a shrug of the shoulders or a shake of the head can often accomplish more than several sentences of dialogue.

After completing the basic construction chart of the cartoon character to be used in a scene or picture, the layout man should indicate the colors to be used for later opaquing of the cels. The drawing containing these color markings is known as the *color model*. The lines separating areas to be opaqued in different colors are known as separation lines and should be closed or connected to other lines.



Model drawings before and after opaquing.



Types of Characters

Cartoon characters usually fit into one of several basic types. The types used most often in animation are: cute, heavy or tough, screwball, and goofy. Each of these types is distinguished from the others by many individual characteristics. Beginning layout men and animators should keep the following notes handy and refer to them when designing or laying out new cartoon characters.

The Cute Type

The most important distinguishing characteristics of the cute type are the physical proportions and attitude. The proportions are similar to those of a baby. The head is large in relation to the rest of the body. The forehead is high, and the eyes are placed about halfway down the head. The ears, nose and mouth are smaller than an adult's.

A very short neck causes the head to look as though it were sitting right on top of the shoulders. The body itself is on the pear-shaped side and a bit longer than normal; the stomach bulges slightly; the arms and legs are short and rounded. The completed drawing of the cute type of character should always suggest a feeling of delicacy.

The Tough Type

The heavy or tough character, usually the villain, has many distinguishing features and characteristics that set him apart from all other types.

Built along bigger lines than other characters used in the same picture, the tough or bully type usually has a tremendous chest which tapers down to a small waist. Normal-sized feet are topped by short, heavy legs. The head

and facial characteristics differ greatly from those of all other types. Although the head is comparatively small in relation to the rest of the body, heavy jowls and a jutting chin are usually quite prominent. Small ears, heavy eyebrows, small, beady eyes, and a protruding lower lip are the other facial characteristics that stand out above a heavy, thick neck.

The Screwball Type

The screwball and goofy types have many physical similarities. The main difference between them is in the body mass itself. The goofy type is shaped almost like a banana, while the screwball type is built along pear-shaped lines.

The screwball type has exaggerated features, such as a low forehead, long head and a normal-sized but overly skinny neck. Big feet and skinny legs that support the pear-shaped body are the more important distinguishing body characteristics.

The Goofy Type

The goofy character usually has a smaller-than-normal head that is angled slightly forward from the body by a long, skinny neck. His hair may or may not hang over his forehead, but his eyes almost always have a half-closed, sleepy look. An oversized nose, buck teeth, a receding chin, and a prominent Adam's apple, which bobs up and down when the character talks, complete the head and facial characteristics.

Some of the other distinguishing features are stooped shoulders, a sunken chest, long arms, big hands and a protruding waistline. Baggy pants and oversized, clumsy feet complete the picture.

Backgrounds

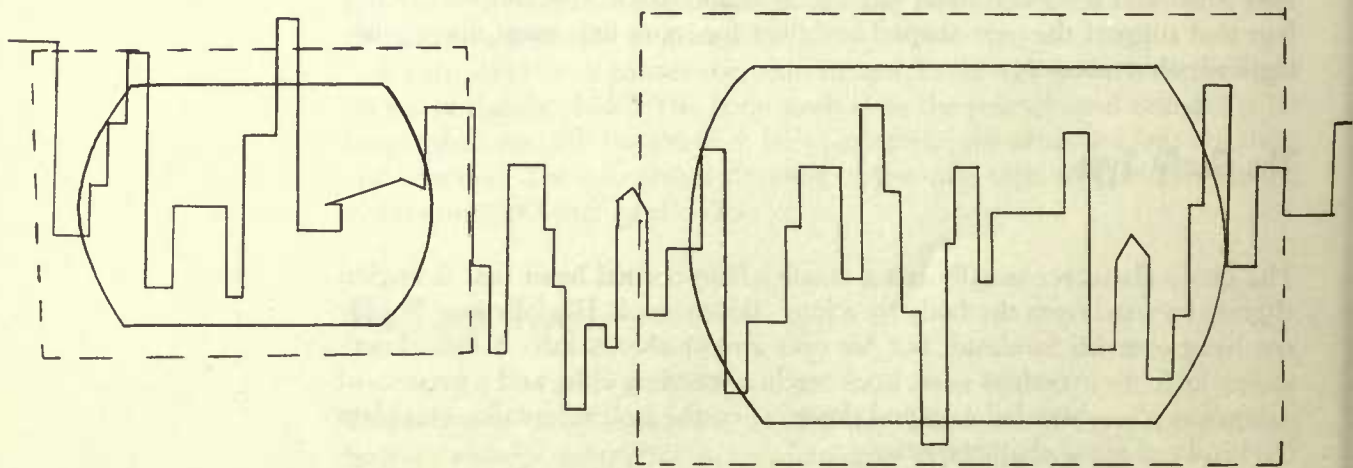
Backgrounds have an important function in an animated cartoon made for theatrical release. Backgrounds not only serve as a setting for the action in a scene, they sometimes subtly help to put over a gag or comic situation. Painted by accomplished artists and designers, some backgrounds made for animated theatrical films could be framed and hung.

In commercial animated production, backgrounds play an entirely different part. Since the emphasis in these films is on the "sales pitch" or message, the reasoning of the client and the ad agency is that anything on the screen not absolutely essential to the commercial would be distracting. Therefore, background detail in commercial animated films is kept to a minimum; abstract and stylized backgrounds are the rule.

The layouts on this page show how the backgrounds for an animated commercial film are developed.

Upon completing the background layouts, the layout man and background artist discuss and agree on the technique to be used in rendering the backgrounds.

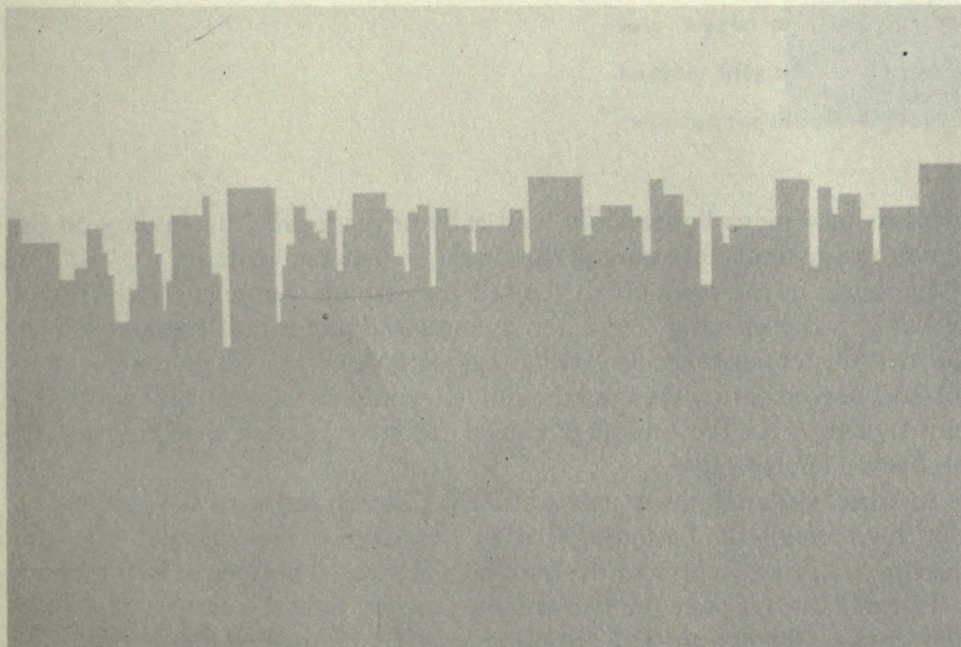
There are two types of backgrounds, *still* and *pan*. A still background is one that remains in a fixed position during an entire scene. A pan background is one that is made to move during the photographic process. Pan back-



Background layouts.



Still background.



Pan background of skyline.



grounds may move horizontally, vertically or diagonally, depending on the action and general movement of the character being animated.

Inasmuch as the story board showed the cartoon character, Mr. Wimple, walking in the opening scene, the animation director and the layout man decided that an abstract, pan background was desirable. To give some interest and movement to the background, they added the soft silhouette of a city skyline, with the buildings placed far enough back to eliminate any problems in perspective.

Another background was needed for the close-up scenes in the production. For these scenes, the background artist was asked to make a solid-tone, still background, consistent with the building colors used in the pan background.

Pictured on this page are two frames showing how the cartoon character looks against the pan and still backgrounds in the completed film.

Part III

Production

Here, sleeves are rolled up, pencils are sharpened, and the animated commercial goes into actual production. The processes described take between three and four weeks and use the combined talents of approximately fifty artists who prepare the drawings and cels required for the photographic process that follows.

5847		G.E. RADIO		NO WIMPLE		DO. 1		DO. 5	
STORY:		ANIMATOR:		ASSISTANT:		DO. 1		DO. 5	
		(OPENING)							
		PAN. BKS A		BKS (B1)		BKS (B2)		BKS (B3)	
1									
2									
3									
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START AT 99968 on 11/1/54

The Exposure Sheet

The ledger-like sheets reproduced on these pages are known in the animation industry as *exposure* or *X* sheets. Like bar sheets, exposure sheets account for every frame of animation in a commercial. Both are used as a guide during the production processes; but the bar sheets are used by the animation director, film editor and animator, while the exposure sheets are used by the inbetweeners, inker, colorer, planner, checker and cameraman. The animation director makes out the bar sheets before production begins, whereas the animator makes out the exposure sheets as he animates. The bar sheets remain in the animation director's possession at all times during the production of the commercial, but the exposure sheets go with the scene as it progresses from one department to the next.

Exposure sheets contain information and instructions required for each production process that follows animation. The sheets indicate the exact order in which the cels are to be photographed by the cameraman; they also include a description of the sound and the action taking place, as well as background notes, camera instructions, and other general information pertaining to the scene.

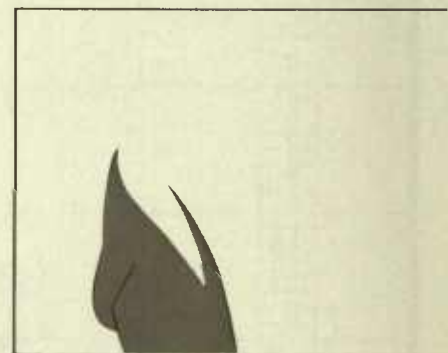
Section of exposure sheet.

PICTURE NAME	NO.	SCENE	FOOTAGE	SP.
MR. WIMPLE		3		2
(CLOSE UP)				
1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
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51	52	53	54	55
56	57	58	59	60
61	62	63	64	65
66	67	68	69	70
71	72	73	74	75
76	77	78	79	80
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86	87	88	89	90
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661	662	663	664	665
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766	767	768	769	770
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781	782	783	784	785
786	787	788	789	790
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866	867	868	869	870
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876	877	878	879	880
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956	957	958	959	960
961	962	963	964	965
966	967	968	969	970
971	972	973	974	975
976	977	978	979	980
981	982	983	984	985
986	987	988	989	990
991	992	993	994	995
996	997	998	999	1000

The Hold Cel



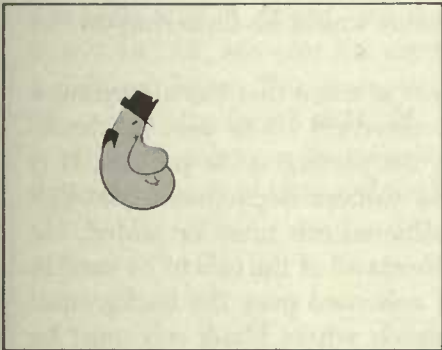
Hold cel 1



Hold cel 2

The use of the *hold cel*, a cel that is held still for several frames during some portion of an animated sequence, is one of the most effective means of avoiding unnecessary inking and coloring. A hold cel is made when, during the course of an animated action, the character's movement is brought to a complete or partial stop for any length of time.

Imagine, for example, an animated sequence in which a cartoon character stands still while speaking. In such a case, the animator can make a separate drawing of the head and body of the character and indicate on the exposure sheet that it is to be held for the length of time the character remains in the still position. Then the animator need only draw each new mouth action instead of the full head and figure. And later, the inker and colorer will have only one cel of the head and body to trace and color instead



Action cel 3



The three cels placed in position over the background, as they will appear on the finished film.

of the great number that would be required if the inker had to keep retracing the head and body for each new mouth action.

Hold cels can be used in many situations. In the accompanying illustration, the drawings of Mr. Wimple's arms and body have been held while the head continues to be animated.

Not only do hold cels save work, but the results obtained through their use are infinitely better than those achieved through retracings or tracebacks, as the danger of jiggling ink lines, which might result from continual re-tracing, is completely eliminated.

A great work-and-time-saver, the hold cel should be used wherever possible. Many examples of its efficient use are to be found in Part V, The Commercial.

Cel Levels

The number of cel levels (the number of separate drawings to be photographed at the same time) used over the background must be consistent throughout a scene. This is the only way to ensure uniform density over the background of the scene. If this were not done and some frames in a scene were photographed with, for instance, two cel levels over the background, and others with three or more levels, the result would be flickering on the screen.

In order to avoid such an undesirable effect, a scene that has a maximum of three cel levels, for example, must have three cel levels over the background for each frame of the scene during the photographic process. It is the animator's responsibility to instruct the camera department, through his notes on the exposure sheets, where additional cels must be added. He does this by first recording on the exposure sheets all of the cels to be used in the scene. Then, if he finds the number of cels used over the background inconsistent, he indicates on the exposure sheets where blank cels must be added.

It is the maximum number of cels over the background at *any* point in the scene that establishes the cel level to be used for the whole scene. When the animator finds he has four levels exposed as the maximum at any point in a scene, that scene becomes a four-level scene. This same rule applies to one- two- and three-level scenes.

Five-level scenes, or anything over that number, should be avoided if possible. Although the cels or acetates used are completely transparent and only .005 of an inch thick, each cel used over a background will tone it down somewhat. Five cel levels will gray a background down considerably.

Section of an exposure sheet for a three-level scene. A blank cel has been inserted in column 3 to keep the number of cel levels in the scene consistent.

PROD. NO.		CLIENT		PICTURE NAME		NO.	SCENE	FOOTAGE	SHEET NO.	NO.
5847		G.E. RADIO		MR. WHIPPLE		1			2.	5
SYNOPSIS:				(OPENING)				ANIMATOR'S STAND NO.		
ANIMATOR:										
ASSISTANT:										
DIAL	TRACK	ACTION	DIAL	REELS	1	2	3	4	DIAL	
1	1		1	1					1	
2	2		2	2					2	
3	3		3	3					3	
4	4		4	4					4	
5	5		5	5					5	
6	6		6	6					6	
7	7		7	7					7	
8	8		8	8					8	

Exposure Numbers

The animator should number all drawings used in a scene as simply as possible. Obviously, the number assigned to a particular drawing on animation paper should also be used for the cel on which the drawing is traced.

If more than one cel level is animated in a scene, each level should be numbered differently. A good system for identifying cel levels is to use numerals only—1, 2, etc.—for the first cel level; a number and an alphabet letter—1A, 2A, etc.—for the second level; and for each additional level use a different letter. For example, the third level would be identified as 1B, 2B, etc. and the fourth as 1C, 2C and so on.

Mixing numbers in an animation sequence can only cause great confusion, a needless waste of time and the likelihood of errors.

DIAL	BKGD.	1	2	3	4	DIAL
1	BKgd	1				1
2	#10	1A	1B	1C		2
3		2	2A	2B	2C	3
4		3	3A	3B	3C	4
5		4	4A	4B	4C	5
6		5	5A	5B	5C	6
7		6	6A	6B	6C	7
8		7	7A	7B	7C	8
9						9
0						10
1						1
2						2
3						
4						

Exposure sheet on which each cel level is identified by a different letter: the ideal procedure recommended by the author.

Ones, Twos and Threes

Because of the differences in the comparative speeds of certain actions or movements, animation is drawn to be exposed on either *ones*, *twos* or *threes*. This refers to the number of times each drawing in an action is photographed. A drawing that is exposed on threes, for instance, is photographed three times, that is, the same drawing is repeated on three consecutive frames of film. When an action is drawn to be exposed on ones, that means there is a different drawing for each successive frame: if drawn to be exposed on twos, there is a different drawing for every second frame only.

Obviously then, only half as many drawings are required for an action animated on twos as are necessary for a similar action animated on ones. Since most animated action on twos will be just as smooth as a similar action on ones, almost all animated action should be planned for exposure on twos.

However, there are some instances when animation on twos is not preferable. When the action is fast and the drawings do not overlap, as in violent or widely spaced animation, the action should be planned for exposure on ones. When a cartoon character or object comes in contact with a pan background that is moving on ones—one frame for each background move—the animator should plan the action for exposure on ones also.

If, however, the character or object being animated is not making contact with anything specific on the background, the animation may be on twos, even if the background pan is moving on ones. An illustration of this occurs in the opening action of the commercial serving as our example. Since the character, Mr. Wimple, is in the foreground and no definite relationship exists between his walk and the movement of the pan background, he is animated on twos, while the background moves on ones.

When the scene being animated calls for an extremely slow or closely spaced action with very little movement between drawings, it is possible to animate for exposure on threes. In such cases, the thickness of a pencil line should be the maximum space separating the inbetweener's drawings. Closely spaced drawings must be very carefully animated and inbetweened to avoid a jiggling motion of the closely placed lines when the animation is seen on the screen. No action should be planned for exposure on threes when background panning or any other camera movement is required during the action.

Animation

An animator's value to a studio largely depends upon how well he knows all phases of animation, for he can only take full advantage of all established short cuts if he has sound all-round knowledge of animation studio procedures.

Some of the most frequently used time and labor savers include the clever use of repeat actions, the use of animation on twos whenever possible, combining drawings for the purpose of reducing the number of cel levels, and the elimination of unnecessary retracing through the use of hold cels.

By taking advantage of such short cuts and other efficient methods, the animator will not only save considerable time of his own but also help cut the studio's production costs.

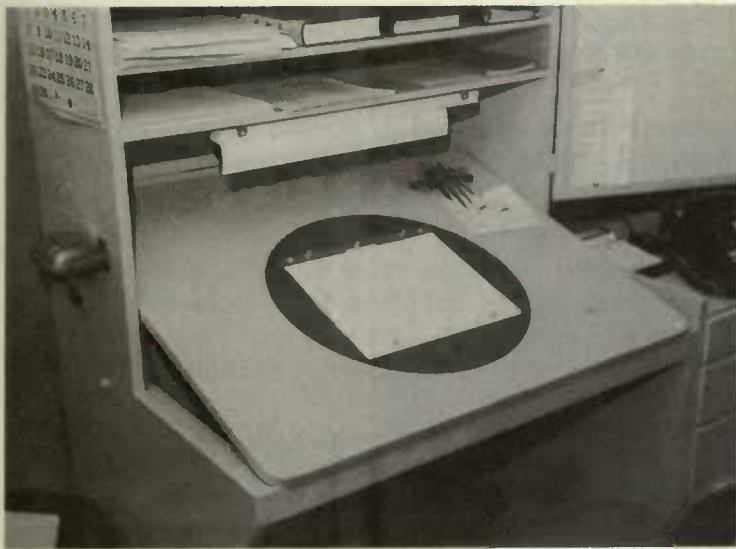
The Animation Board

The *animation board* differs from other drawing boards in two ways: 1) Provision is made for the registration of drawings through the use of pegs; 2) the center portion is made of glass and is lighted from underneath.

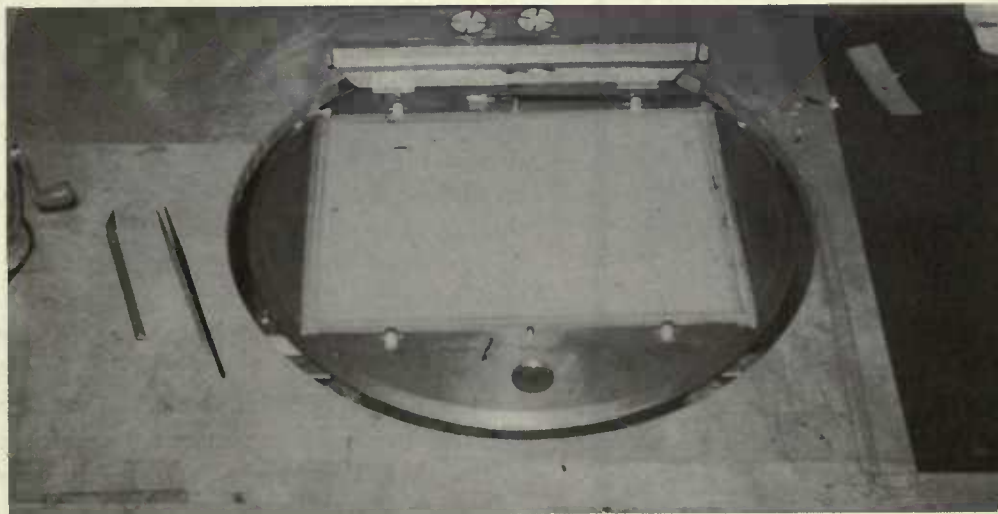
The animation boards shown here have two sets of pegs, one set at the top and the other at the bottom. With this arrangement, it is possible to animate on either set of pegs and still have another on which to register a background or other drawing that is to move independently.

The peg arrangement ensures a great degree of registration accuracy for the studio worker, but those working at home can achieve positive registration through the use of crosses and circles. This method is widely used throughout the advertising and printing fields.

Some animation boards are on a swivel so that they can be turned in any direction. The swivel animation board is usually used only by the inker for whom it was originally designed in order to make it easier to trace certain types of lines, such as circles or arcs.



An animation board on a swivel. The sheet of animation paper, placed over the glass section, is held in position by the pegs.



Close-up of another animation board. The metal plate above the top pegs keeps several sheets of animation paper flat.

Exposure sheet showing how the action of the pendulum could be continued indefinitely by repeated photographing of the five drawings.

Extremes

An *extreme* is a key drawing made by an animator. Key drawings do not usually make up an entire action, but they are sufficient to guide the in-betweener from one position of the character or object being animated to another. Other extreme drawings continue the action from the point of the last extreme drawing.

The illustrations show both extreme and inbetween drawings; they also show the spacing guides the animator places on his extreme drawings for the inbetweeners to follow. These two illustrations apply to the animation of cartoon characters as well as to objects.

In example A, let us imagine the swinging of a clock pendulum as the action being animated. Normally, in any animated scene, each of these positions would be a separate drawing on a separate sheet of animation paper. Here, however, we have combined them in one illustration for clarity and ease in identification.

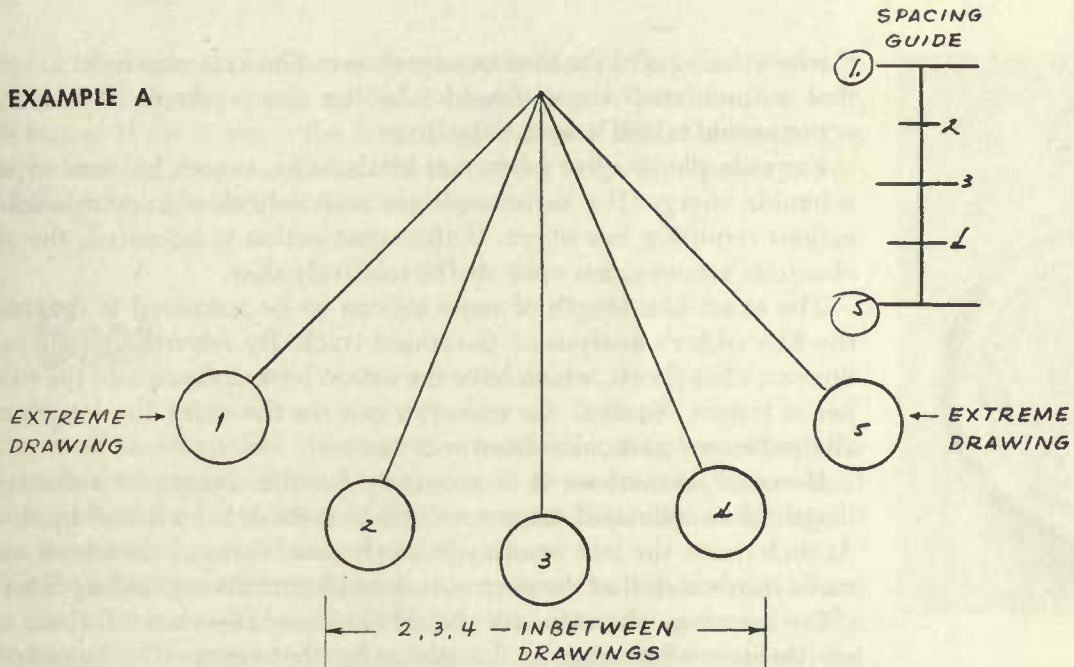
Drawings 1 and 5 are the extreme drawings made by the animator. Notice that on the spacing guide he has called for evenly spaced movements. The inbetweener is then responsible for making drawings 2, 3 and 4 exactly as shown in example A.

In example B, drawings 1 and 5 are again the extremes. This time, however, the animator wishes to slow the action of the pendulum as it reaches the end of its arc. In his spacing guide, he has indicated exactly the amount of slowdown he desires. Here, too, drawings 2, 3 and 4 are the inbetween drawings. Notice, however, the difference in spacing from example A. When the animator wants the spacing of the drawings for an action to change, such spacing notes are indicated on the last extreme drawing before the change in spacing is to occur.

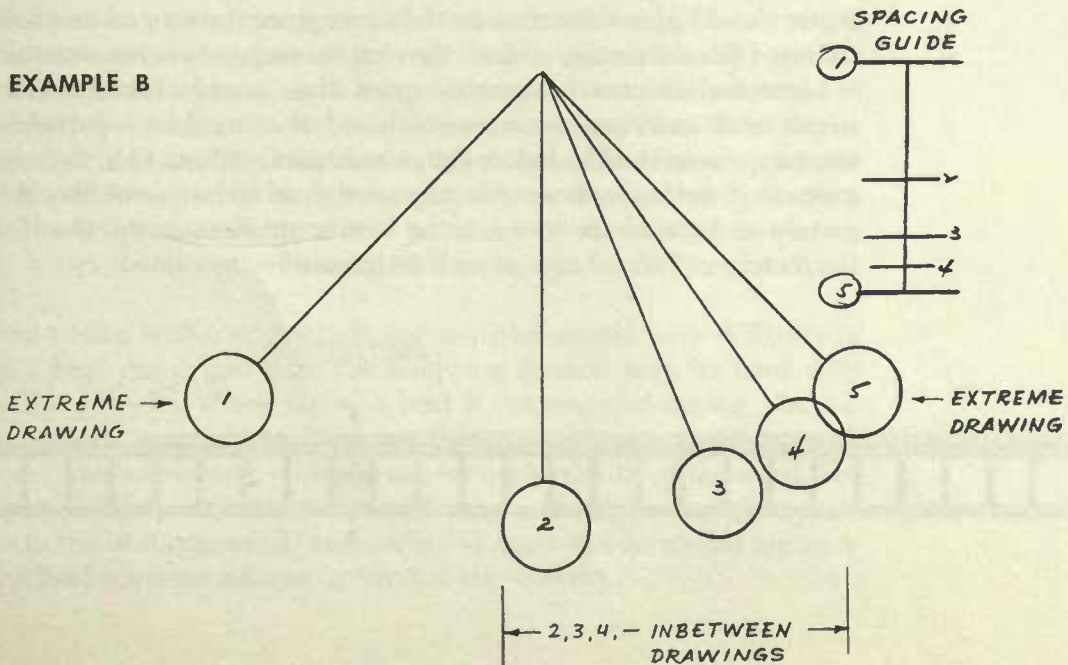
Should the animator wish to continue the swinging action of the pendulum for a required film length, he would simply indicate the numbers of the drawings on the exposure sheet. No new drawings would have to be made. For instance, if the action starts with the pendulum at one end of the arc, as in example A, the first drawing exposed is number 1. The animator would then write numbers 2, 3, 4 and 5 in that order on the exposure sheet. Having reached the other end of the arc, the animator would continue with drawings 4, 3, 2 and back to number 1. Then he could start the whole process over again. Thus, by using only five drawings, the animator could continue the cycle of action indefinitely.

PICTURE NAME				NO.	SC
<div style="position: relative; height: 100px;"> <div style="position: absolute; top: 10%; left: 40%; transform: rotate(-15deg); font-family: cursive;"> Pendulum ACTION </div> </div>					
1	2	3	4	DIAL	.
			①	1	
			Y	2	
			3	3	
			4	4	
			⑤	5	
			4	6	
			3	7	
			Y	8	
			①	9	
			Y	10	
			3	1	
			4	2	
			⑤	3	
			4	4	
			3	5	
			Y	6	
			①	7	
			Y	8	
			3	9	
			4	10	
			⑤	1	
			4	2	
			3	3	
			Y	4	
			①	5	
			Y	6	
			3	7	
			4	8	
			⑤	9	
			4	10	
			3	1	
			Y	2	
			①	3	
				4	

EXAMPLE A



EXAMPLE B



Timing



Correct timing is of the utmost importance. The animator must keep in mind that an animated action should take the same amount of time the same action would take if it were done live.

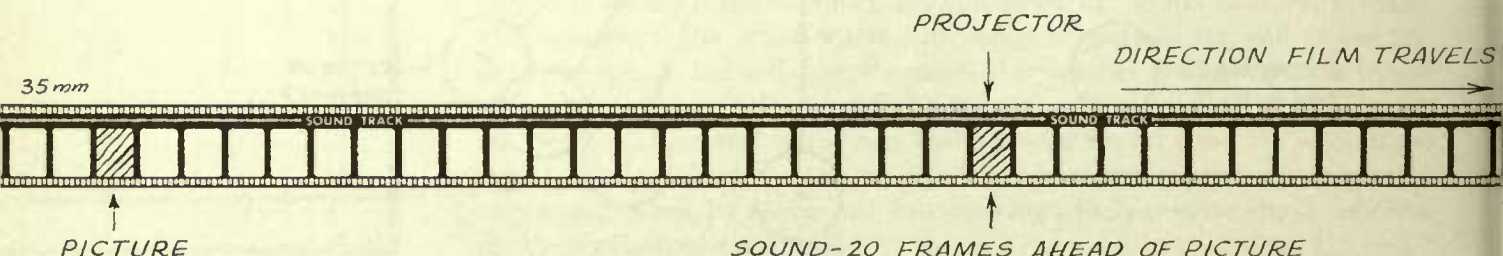
For example, if a live performer lifts a heavy object, he must expend considerable energy. His movements are relatively slow as compared to other actions requiring less effort. If this same action is animated, the animated character's movements must also be relatively slow.

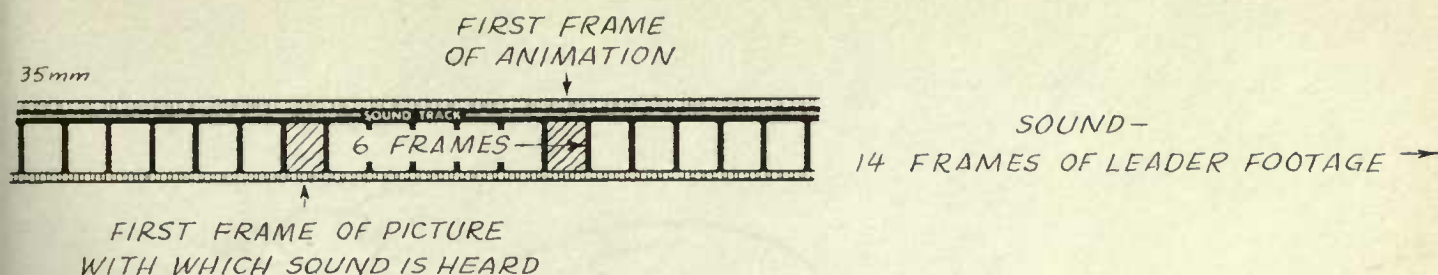
The exact film length of most actions to be animated is determined by the film editor's analysis of the sound track. By referring to the animation director's bar sheets, which have the action broken down into the exact number of frames required, the animator can see the exact film length and time allotted to any particular scene or action.

However, sometimes it is necessary for the animator to determine the length of an animated sequence for which there is no sound-track analysis. At such times, the best results can be obtained through the use of a specially made stop watch that shows time in seconds and corresponding film footages.

For accuracy, the animator should clock an action several times and then use the over-all average as the timing for that action. The animator, for instance, may get a reading of six seconds on the first timing, seven seconds on the next, and six and one-half seconds on the third. In this case, the animator should plan the action to the average, or the six-and-one-half-second timing. (See the timing table in the chapter on Lip Synchronization.)

Light travels at a far greater speed than sound. Therefore, when the sound track and visual reels are combined, the sound for a particular action must appear on the film before the animation. On 35mm film, the sound must precede its action by five-sixths of a second, or 20 frames of film, if both the picture and sound are to reach the viewer simultaneously. On 16mm film, the picture and sound separation is 26 frames.





Singing or dialogue should never begin on a scene's first frame of animation. The first sound must be spaced so that it is not heard until at least the sixth frame. If the scene is the first one on a reel of film, this spacing is achieved by starting the sound track on the leader strip which always precedes the first frame of a reel.

The Beat

A *beat*, as used in animation, refers to the audible or visual marking of a specific interval or period of time. Beat is used to mean both the musical beat or tempo and the breakdown of that tempo into *taps*. A 24 beat would mean one tap for each second, or every 24 frames of film.

If no musical background accompanies an animated scene and the sound track is clear, a beat should be established by the animator and used as the rhythmic basis for the animated action. Should the animator decide to plan his action to a 12 beat, that would be the equivalent of two taps for every 24 frames of film or two taps per second.

As the scene or picture progresses, the beat should be quickened to 11, or slightly more than two taps each second, then to ten, and finally to a nine beat or almost three taps per second. An action does not usually become so fast or violent that it becomes necessary to animate to anything faster than a nine beat. But if an exceptionally fast action is called for, an animator can use an eight or even a seven beat, but practically never any beat faster than a seven. The seven beat might be used for such animated actions as chases, runaway horses, imminent collisions, or other actions leading to the climax of a scene.

If, when timing with a stop watch, the animator should have difficulty in breaking a beat down into taps, the following method may be used with fairly accurate results. If one tap to a beat is the required timing, the animator should say the word "one." For two taps to a beat, a two-syllable word, like "seven," should be used, with one tap for each syllable of the word. For three taps to a beat, the animator should use the word "animate," and for four taps to the beat, the word "animation," in each case he should tap once for each syllable of the word.

Accent and Anticipation

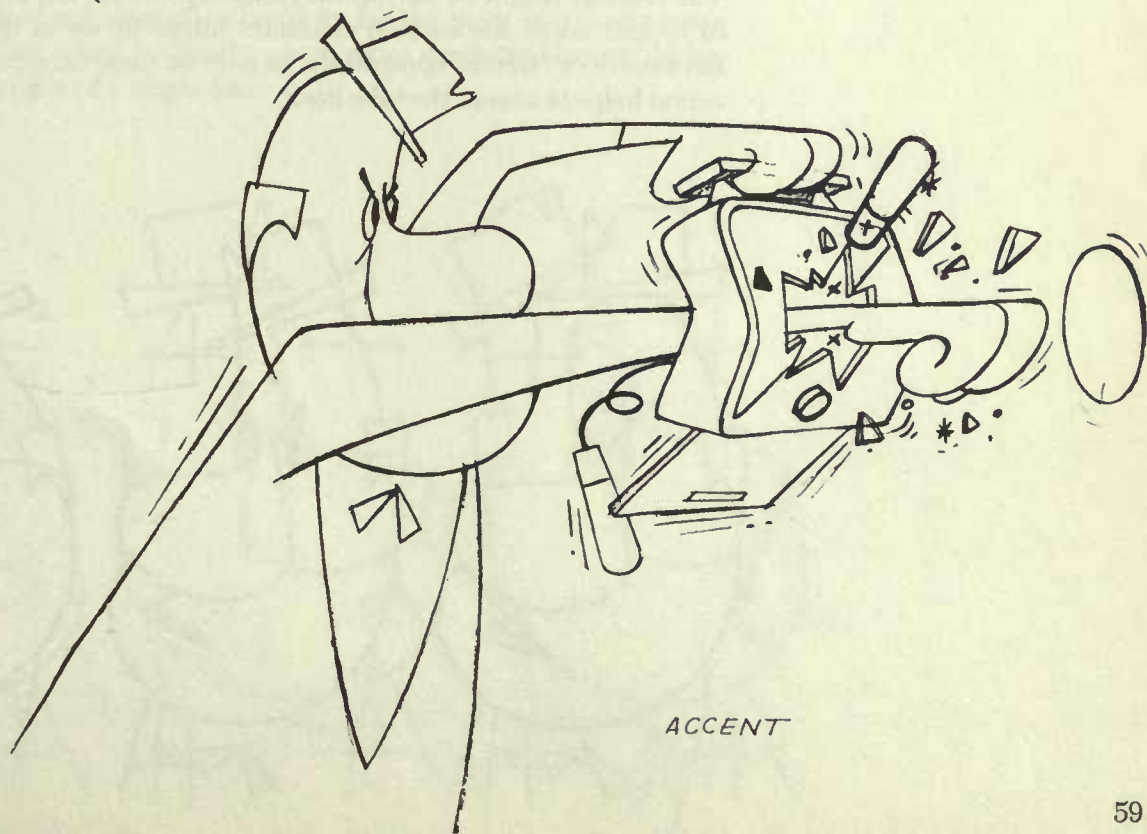
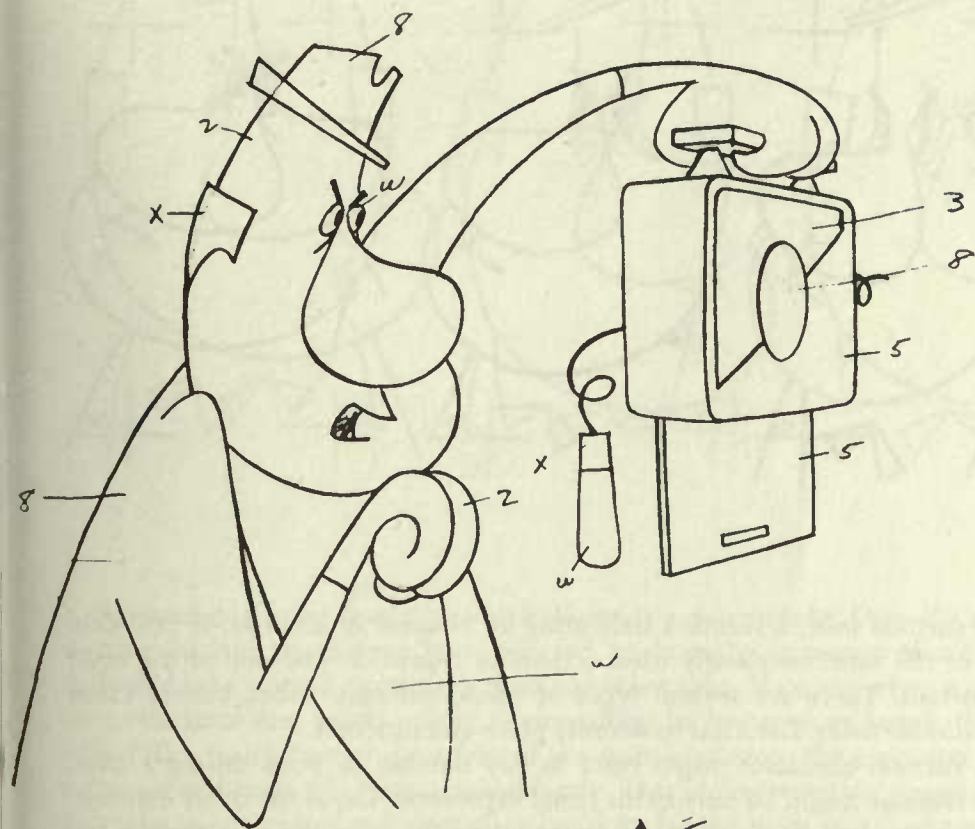
When an animator is working on a scene that has a musical background, he should be constantly aware of beats and accents. The best way to accent an action is to use a change of pace. If, for example, an animated character is running to a definite beat, but the action is all evenly spaced, there will be no accented position. However, a change of pace, either slowing down or speeding up the character's action will not only emphasize the beat but provide an anticipatory action as well. Speeding up the animation between accents will have a similar effect. In either case, a change of pace is a necessity; and the greater the desired accent, the greater the change of pace should be. This basic rule can be applied to almost all animated action, including mouth actions.

Here are some other good rules for the animator to keep in mind. The faster the beat, the more accurate the *hit* or accent must be. Accuracy is especially important if the beat is faster than a nine beat. In such cases, the hit must occur exactly on the frame with the tap. Where a slower beat is used, such as a 12 or 16 beat, the accented action may hit two frames before the frame of the tap. These rules also hold true when an animated action is being timed to a sound effect rather than a musical beat.

An accented pose becomes much more emphatic when it is preceded by a preparatory action: an *anticipation*. Anticipation plays a very important part in animation. The holding of a static pose before an animated action begins can be called an anticipation. A slower action preceding or leading up to the action to be accented is also an anticipation. The *take*, described in the next chapter is a wonderful example of anticipation and accent because it takes full advantage of the principles described here.

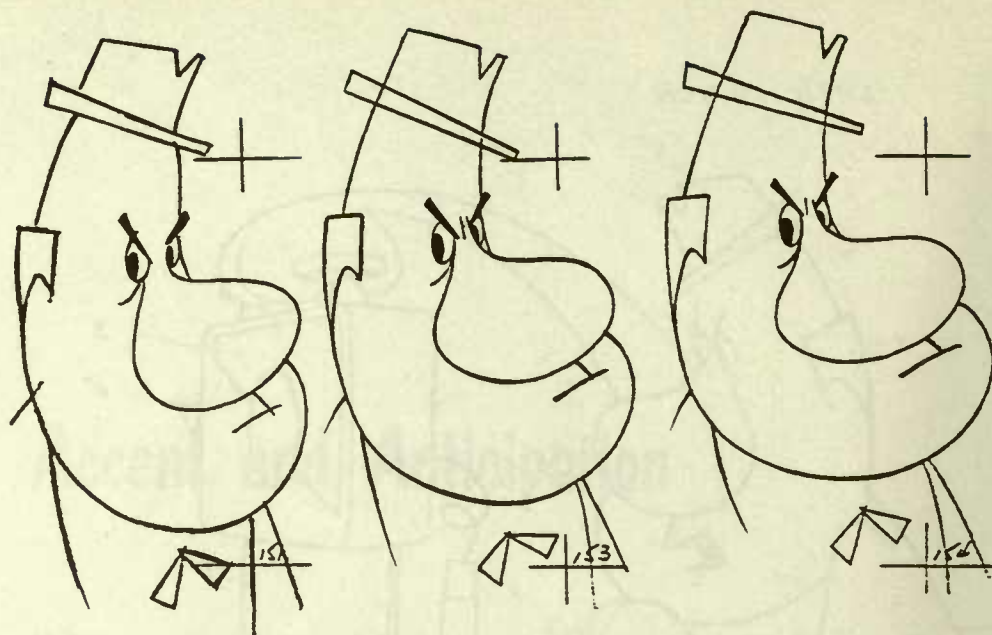
An accent becomes more emphatic as the time gap between it and the anticipatory action increases. The greater the number of frames between the two, the greater the impact of the accent. The number of frames between the anticipation and the accent will, of course, depend on the previously determined film length of the over-all action as recorded on the sound track.

ANTICIPATION



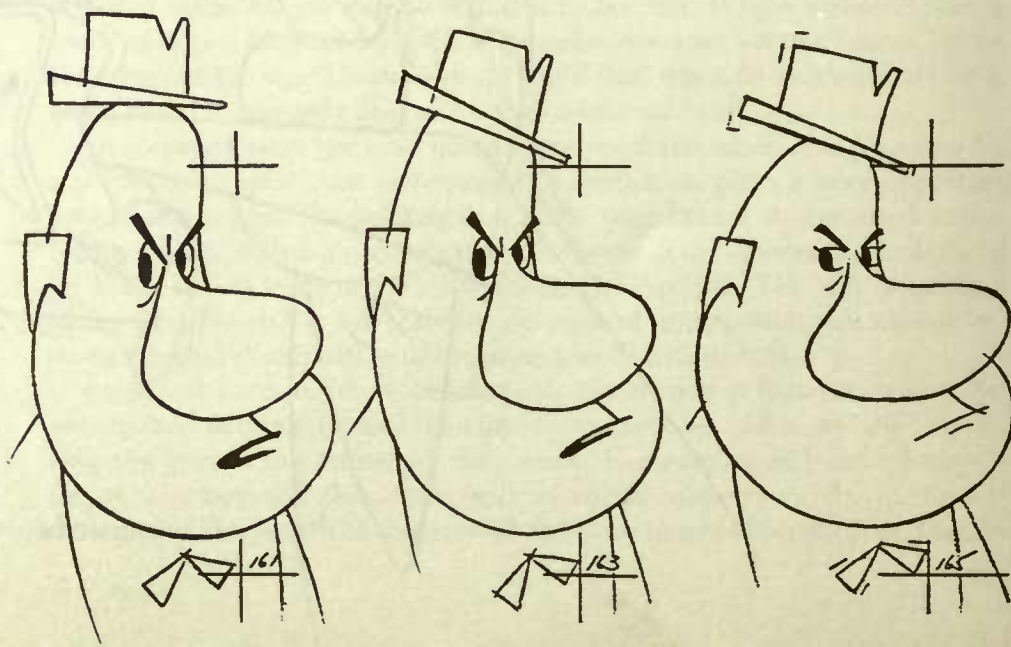
ACCENT

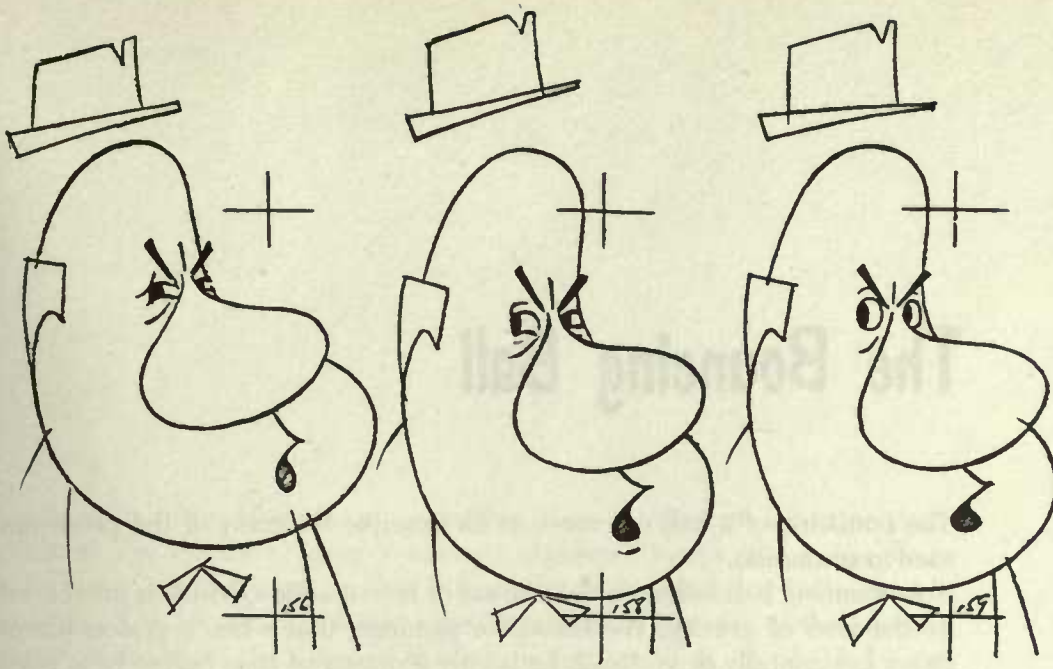
Takes



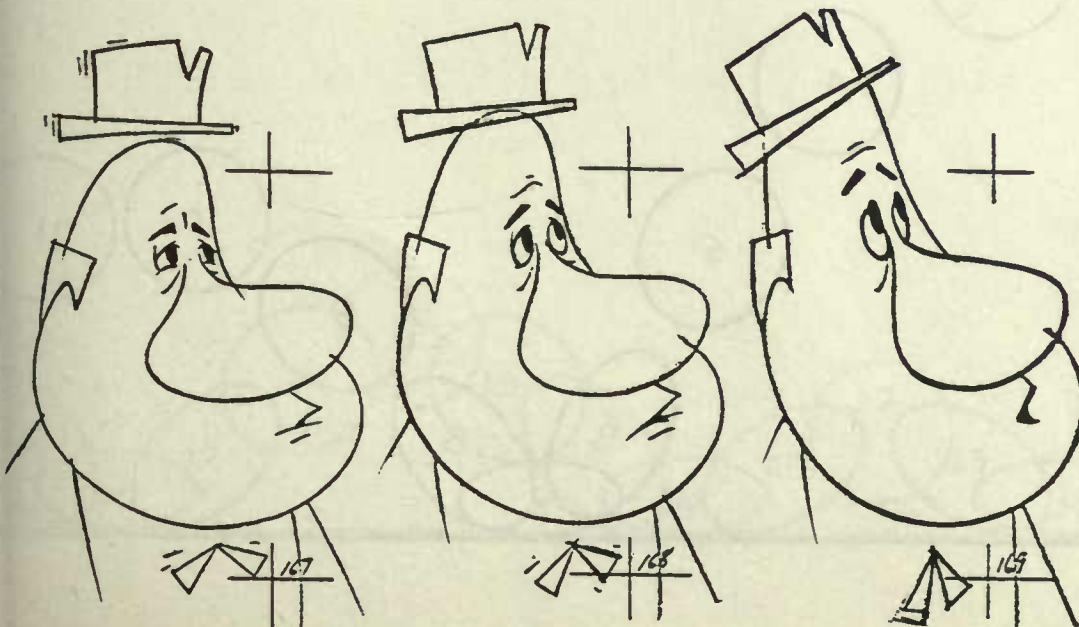
The cartoon *take*, a reaction indicating an element of surprise, is probably one of the most frequently used actions in animation and one of the most important. There are several types of takes: *subdued takes*, *violent takes* and *double takes*. Each has its definite place and function.

A cartoon character might react in any number of ways during a take. The reaction might be only in his facial expression. Or, at the other extreme, in violent takes, the cartoon character might fly up in the air, stagger, fall backwards or "freeze" completely. In each of these takes, a good anticipatory action helps to accent the take itself.





On these pages are drawings which illustrate a double take. Only the animator's extreme poses have been selected to show the sequence of action. A double take is used more often than any other take. It occurs when a cartoon character first reacts mildly to something he has seen or heard; then, with fuller realization of the cause of the initial reaction, the character reacts a second time, this time more violently. This violent reaction causes the first take to become an anticipation, a build-up for the more accented movement, and the over-all action is thereby given more emphasis than could be obtained through the use of a single take.

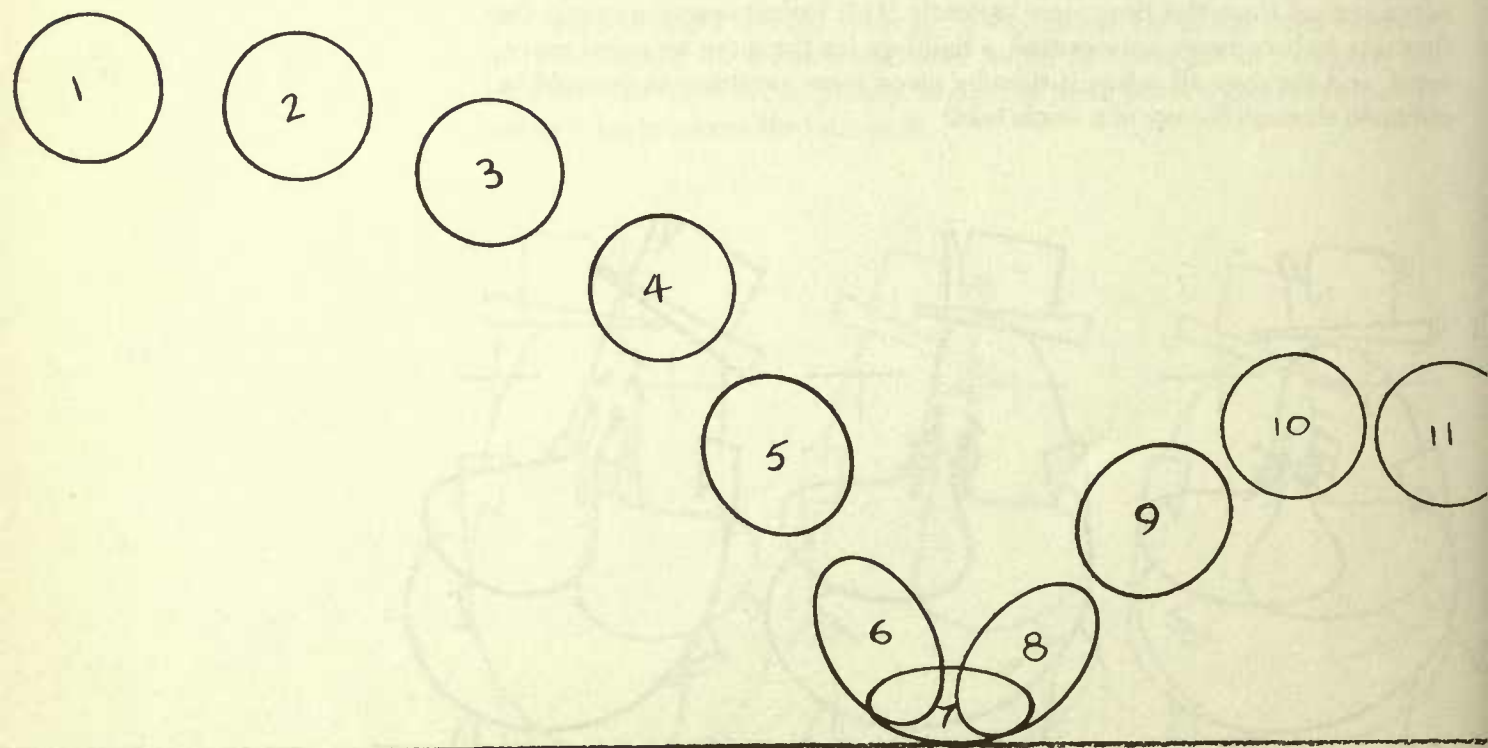


The Bouncing Ball

The bouncing of a ball can serve as an example for many of the principles used in animation.

A bouncing ball follows a definite arc or line of action, which is influenced by the laws of gravity. We know, for instance, that when a person jumps either horizontally or vertically, it is only a matter of time before he is back on the ground, no matter how high the jump. And while the person is in the process of jumping, certain movements occur. Although some of these movements may be classified as illusions, slow-motion studies show that these "illusions" often have substance in reality.

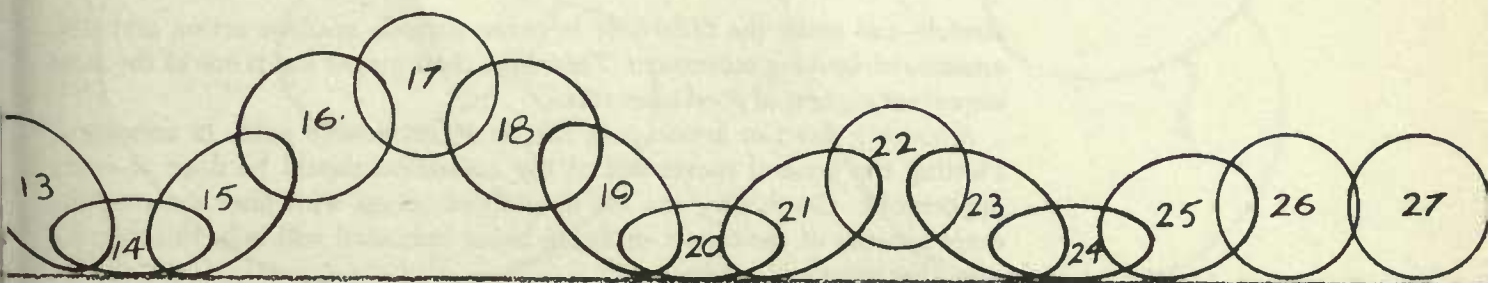
If an animated cartoon character is to look believable, these same move-

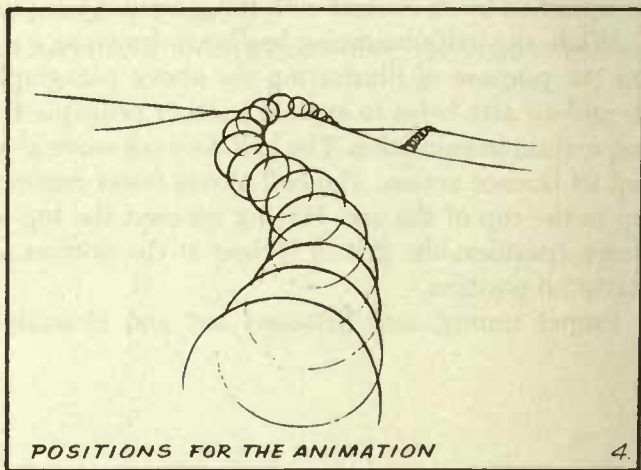
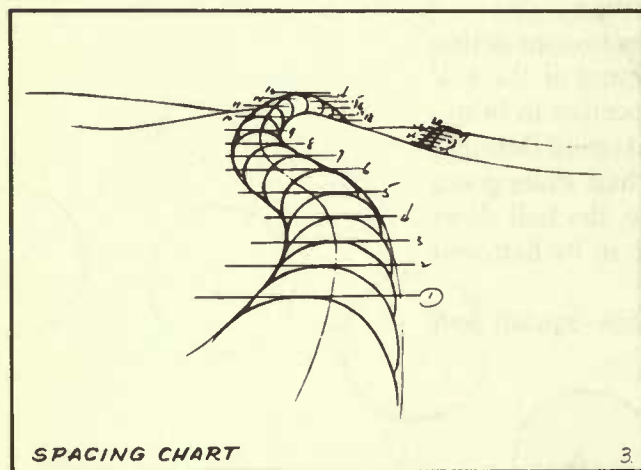
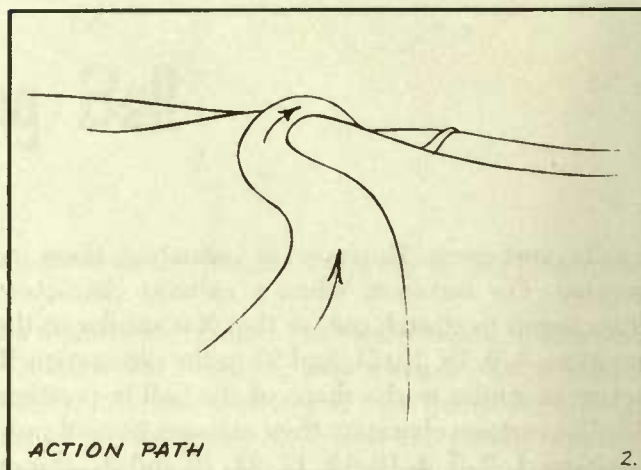
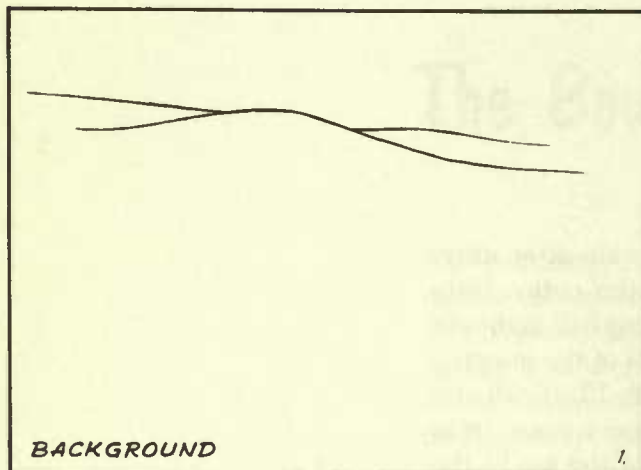


ments must occur. However, in animation, these movements are often exaggerated. For instance, when a cartoon character jumps, the entire body mass seems to stretch out, so that it is similar to the bouncing-ball action in positions 8, 9, 15, 16, 21, and 25 in the illustration. The recoil of the jumping action is similar to the shape of the ball in positions 5, 6, 12, 13, 18, 19 and 23. The cartoon character then assumes normal proportions once again, as in positions 1, 2, 3, 4, 10, 11, 17, 22, 26 and 27, the positions at the top of the bounce. Notice that in positions 7, 14, 20 and 24, the ball has been flattened or squashed by its contact with the ground. This is the *hit* position.

While the ball's bouncing has been drawn as a smooth, continuous action for the purpose of illustrating the above paragraph, the timing of the ball in mid-air also helps to explain another principle that is important in bringing realism to animation. The ball does not move at a constant speed throughout its bounce action. The ball moves faster coming down than while going up to the top of the arc. Having reached the top of the arc, the ball slows down considerably, just as it does at the bottom of the arc in its flattened out or hit position.

Proper timing, and flattened out and elongated positions—squash and





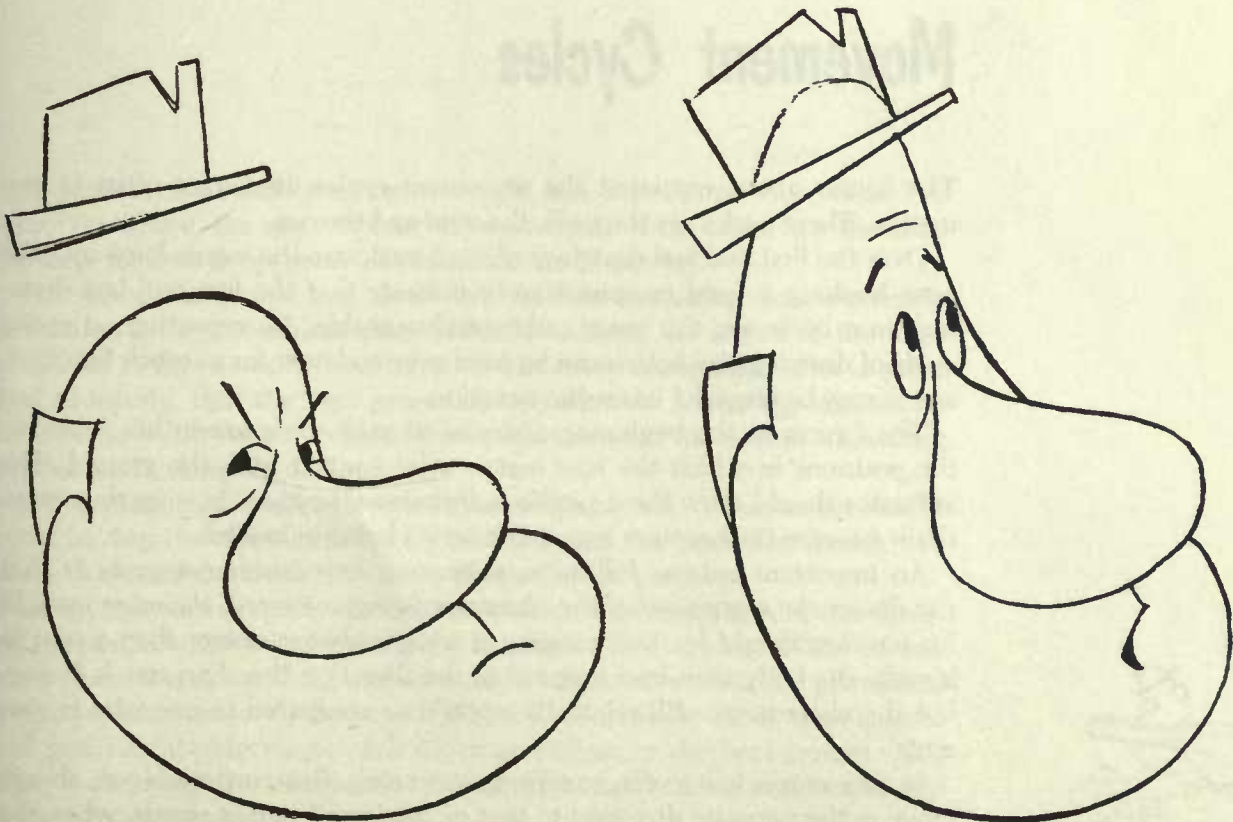
stretch—can make the difference between smooth, realistic action and stiff, amateurish-looking movement. Therefore, their proper use is one of the most important aspects of good animation.

A spacing chart or action path can be an invaluable guide in animation. Plotting the general movement of the animation should be done at every opportunity. Combining the arc or path of action with lines showing the exact spacing of the object or figure being animated will help to achieve a smoother animated action.

Squash and Stretch

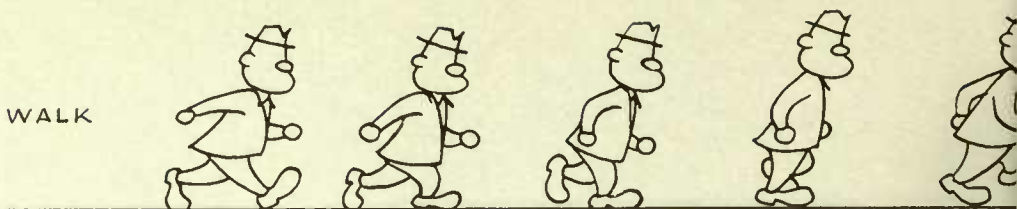
An animated cartoon character's head and body are built around masses of circles and ovals. Exaggeration of these masses so that they *squash* or *stretch* can help give added expression to the face and figure. However, when an animator uses squash and stretch, he should remember to visualize all of the forms or masses as solids with normal dimensions.

Illustrated here is a good example of squash and stretch elasticity in a cartoon character. Notice that the basic construction of the character has been exaggerated so as to achieve greater facial expression but the character's identity has been maintained.

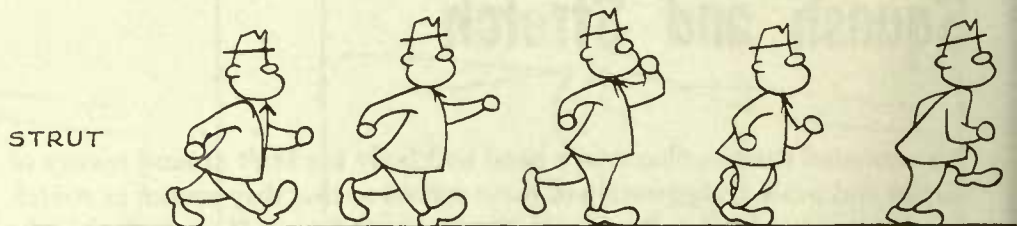


HOOK-UP

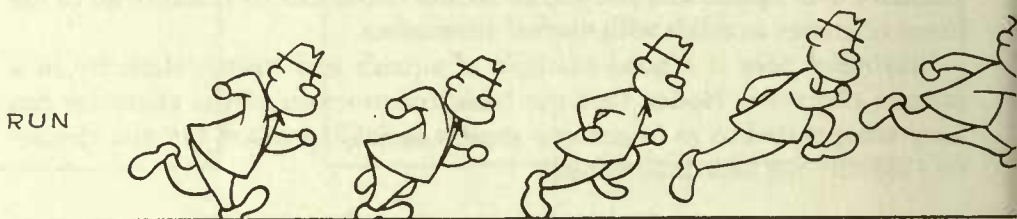
WALK



STRUT



RUN



HIT POSITION

Movement Cycles

The figures above represent the movement cycles used most often in animation. These cycles are the *walk*, the *strut* and the *run*.

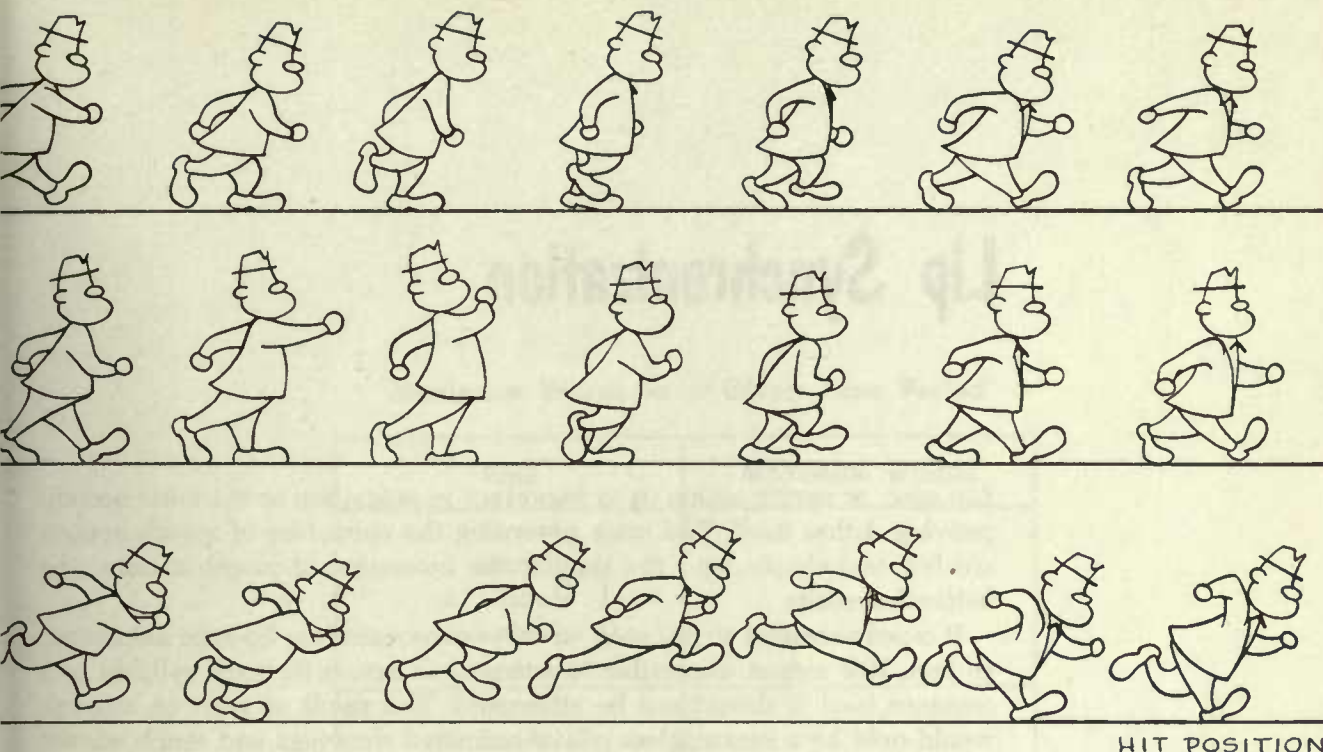
Over the first and last drawings of each cycle are the words *hook-up*. The term *hook-up* is used in animation to indicate that the first and last drawings in a cycle are the same and interchangeable. By repeating an entire cycle of drawings, an action can be used over and over for as much film footage as may be required in a scene or action.

The figures at the beginning and end of each cycle are in *hit positions*, the positions in which the foot makes solid contact with the ground. The animator should draw these positions first since they are the ones that eventually become the key drawings in the action being animated.

An important rule to follow in animating any movement cycle is that *the slower the movement of the character being animated, the more upright his position should be*. For instance, a walk is always slower than a run; in a walk, the body may lean forward in the direction the character is facing, but the character is still relatively upright as compared to one who is running.

In any movement cycle, except an extremely fast run, the arms always move in the opposite direction to that of the legs. In other words, when the





right leg is in a forward position, the right arm is back and vice versa. The faster the action, the more violent the movement of the arms, but the arms continue to move in opposition to the direction of the legs.

For an extremely fast run, however, the rule governing arm movement in relation to leg movement *does not* follow. Since the action of the arms would be so fast as to be confusing, it has been established, after a great deal of testing, that the best procedure to follow in animating arm action for extremely fast runs is to place both arms extended forward in a reaching position and to keep them that way.

When planning a walk to a musical accompaniment, the animator should avoid having the character's heel come down on the beat. The action will always look better if the hit comes on the flat-footed position.

In any movement cycle, the cartoon character always faces in the direction opposite to the one in which the background is moving. When two or more characters are walking or running in a scene and each of the characters is on a separate cel level, the animator should continually check their actions and positions in relation to each other as well as to the background. This kind of checking also enables the animator to match the characters to any objects or props on the background.



Lip Synchronization

Lip sync, or mouth action, is as important in animation as the basic accompanying action itself. The rules governing the animation of mouth actions are few and simple; and the simpler the animation of mouth actions, the better the results.

It is not necessary to put each vowel or consonant into lip-sync animation. In fact, it is almost impossible to animate an action for each syllable in a sentence, and it should not be attempted. The result of such an attempt would only be a meaningless pile of animated drawings and much wasted effort.

The animator must first absorb the over-all feeling of the dialogue before he can decide which words, syllables or sounds should be accented and emphasized. If the animator looks at himself in a mirror while repeating the recorded dialogue, it will help him to select and later to draw appropriate facial expressions for complete sentences. Having made his decisions, the animator's next step is to roughly pencil in the key positions for the mouth actions to be accented. The inbetween drawings will usually carry the balance of the animated dialogue.

When a cartoon character is being animated on twos, it is not necessary to draw the mouth actions on ones unless the character is speaking rapidly. Mouth actions can work as well on twos as they do on ones if the animator accents and emphasizes the right words.

The mouth actions shown in the chart on pages 70 and 71 are the ones used most frequently in animated cartoon dialogue. Each group of mouth actions shows: 1) the start of the formation of a sound, 2) the position of the mouth during the actual pronunciation of the sound, and 3) the closed-mouth position that follows. The vowels are shown in the first five groupings. These mouth actions are slightly less exaggerated for singing.

Surveys have shown that dialogue spoken during a television commercial must be considerably slower than dialogue spoken in a radio broadcast. In television viewing, both the eye and ear work at the same time, so the efficiency of one or the other may be considerably lessened.

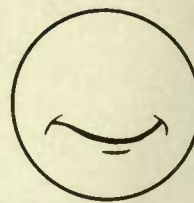
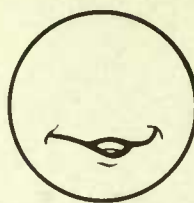
Therefore, the table opposite should be followed diligently when timing unrecorded dialogue. The right-hand column gives the maximum number of words that should be used in the time shown in the left-hand column.

Maximum Words in a Given Time Period

TIME	MAXIMUM WORDS
$\frac{1}{2}$ second	1
1 second	2
2 seconds	4
3 seconds	7
4 seconds	9
5 seconds	11
6 seconds	13
7 seconds	16
8 seconds	18
9 seconds	20
10 seconds	22
15 seconds	33
20 seconds	44
25 seconds	55
30 seconds	65
35 seconds	77
40 seconds	88
45 seconds	99
50 seconds	110
55 seconds	120
1 minute	130
$1\frac{1}{2}$ minutes	195
2 minutes	260
3 minutes	390
4 minutes	520
5 minutes	650
10 minutes	1,300
20 minutes	2,600
30 minutes	3,900
40 minutes	5,200
50 minutes	6,500

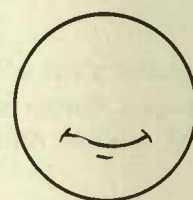
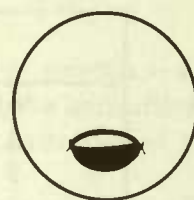
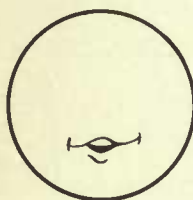
A

Mouth Action	Also Used For
A	R
E	C
I	L
O	Y
U	Q



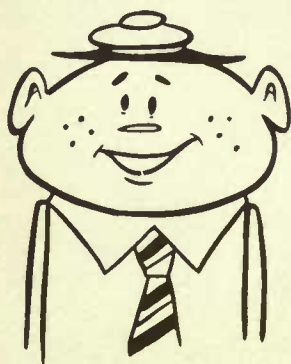
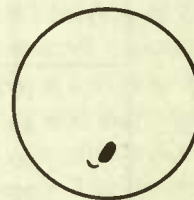
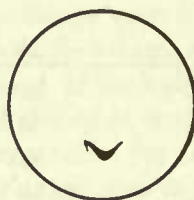
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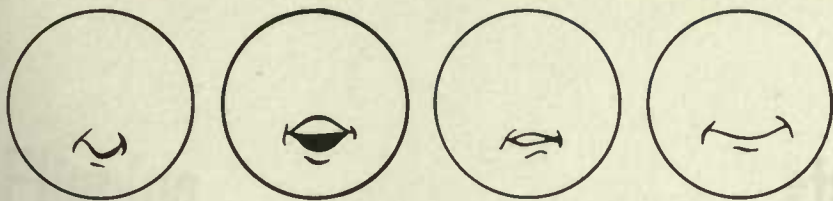


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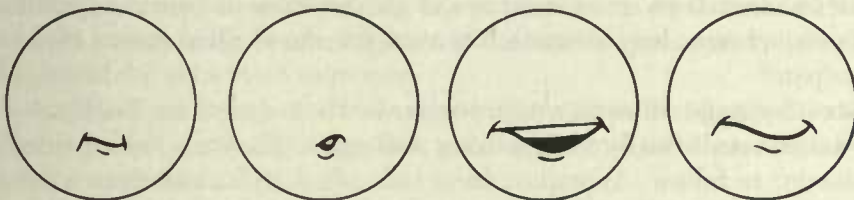
Mouth Action

Also Used For

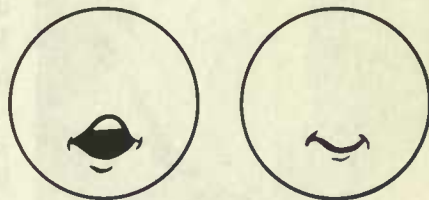
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B, J
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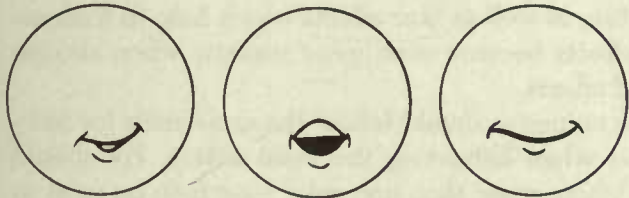
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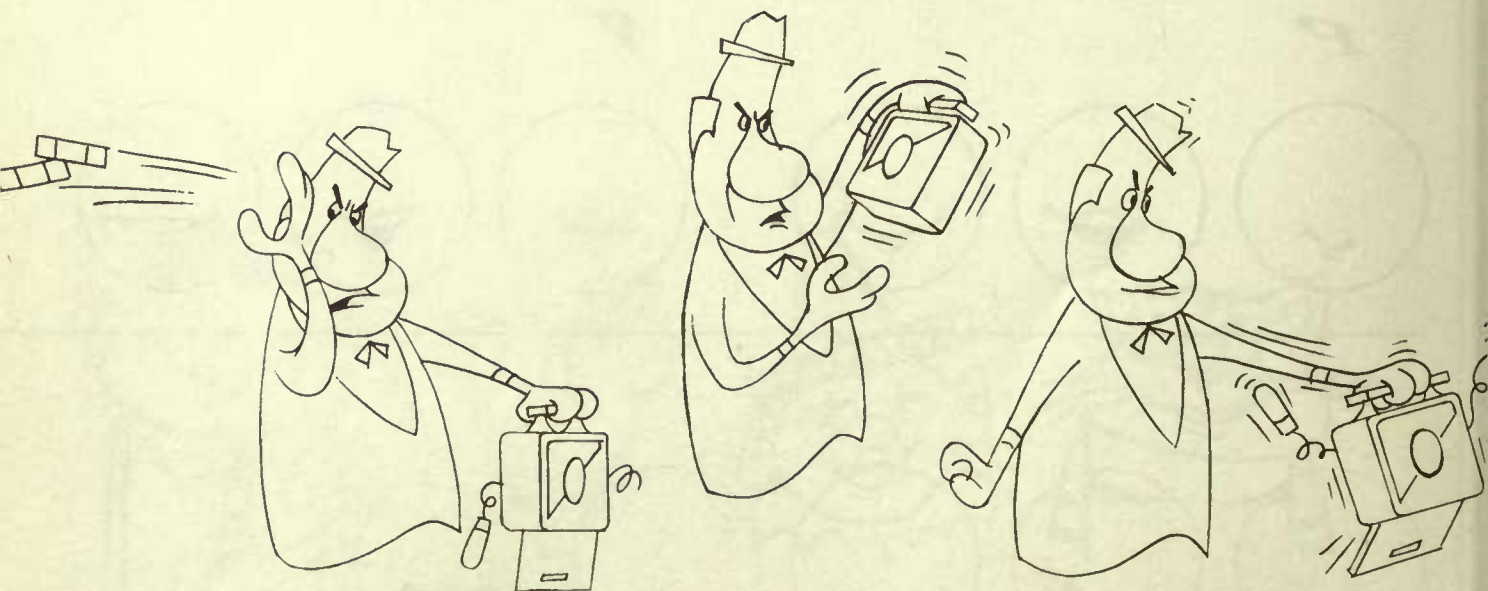
Effects

The cartoonist or animator can only learn how to draw effects through observation. Everyday actions must be carefully studied. For example, how does a ball bounce? Is its downward speed greater than its upward speed? What happens when a drop of water hits a solid surface? How does a cloud of dust dissipate?

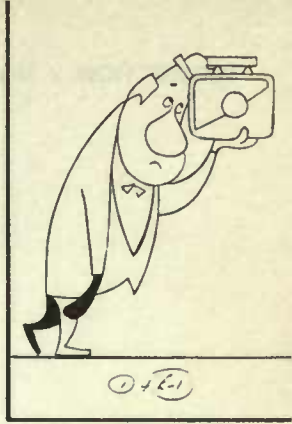
Scientists offer pages of explanation to answer these questions, but drawing these actions realistically is something else again. There are no set rules for an animator to follow. Animators have individual styles and draw similar actions differently. The only requirement is that the action, regardless of the style, must look convincing and realistic when it appears on the screen.

Effects are very important because they help lend reality to a scene. For example, the accompanying illustration uses speed and vibration lines to add reality to the basic actions. Other animation effects often used are: dust, water splashes, smoke and fire, as well as blur effects which help to indicate great speed. These visual effects become even more realistic when accompanied by appropriate sound effects.

When drawing effects the animator should follow the same rules for indicating color that he follows when animating the main action. He should close all lines on drawings where more than one color tone is to be used so that the inker and opaquer can follow the action.



The beginning of a walking cycle. The hand and leg were inked in throughout the cycle in order to emphasize the animation.

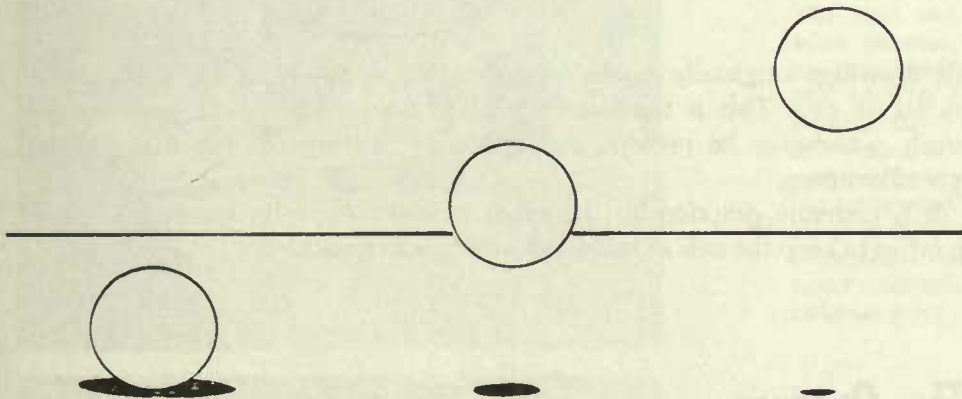
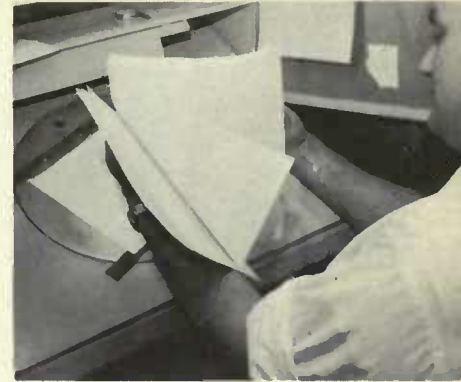


Flipping

In this photograph we see an animator *flipping* through the drawings in a scene. After arranging all the drawings in sequence, with the low numbers on the bottom, the animator can flip through them and see an entire action unfold before his eyes. An experienced animator can approximate the exact timing of the animation sequence.

Any faults or flaws in the animation become immediately apparent through flipping. Individual drawings that need additional work can then be pulled out for correction.

The drawings on the corner of every other page, from 73 to 127, are so arranged that they can be animated by flipping. Practice with them and see if you can approximate a set timing.



Shadows

Unless some special effect is desired, shadows under cartoon characters and objects being animated should be kept to a minimum.

Shadows are used to show the relationship between a character or object in the air and the ground line of the background. The basic rule governing the size of a shadow in animation is simple: the higher off the ground the character or object, the smaller the shadow and vice versa.



The Inbetweener

The hands shown in the accompanying photograph belong to an *inbetweener*. Special attention should be given to the position of the left hand. This hand is used to manipulate the drawings in such a way that at least four are visible at the same time. Through such control, the action of the animation can be seen as a continuous flow rather than as individual drawings.

The right hand, of course, holds the pencil and draws in lines as the movement of the animator's extreme drawings becomes apparent.

The Inker

All drawings originally made on animation paper must be meticulously traced on cels. This is the inker's job. He uses a crow-quill pen or a fine brush, whichever he prefers, and a quality, waterproof ink that will not spread or creep.

It is common practice for the inker to wear white lintless-cotton gloves in order to keep the cels as free from smudges as possible.



The Opaquer

The *opaquer* uses a brush to apply the colors, which range from black through varying tones of gray to white. The gray tones are numbered from one to ten. The lower the number, the lighter the color.

Although cels are clear and transparent they do have a slight density. As a result, when the blank portion of one cel is placed over the opaqued portion of another, the cel on top darkens the opaqued color of the cel beneath it by one full shade of gray. Therefore, if the same color value or density is desired on the opaqued portions of both cels, the upper cel must be opaqued one shade darker than the cel beneath it. For example, if the lower cel had been opaqued with #1 gray, the cel over it would be painted with #2 gray.



The inker



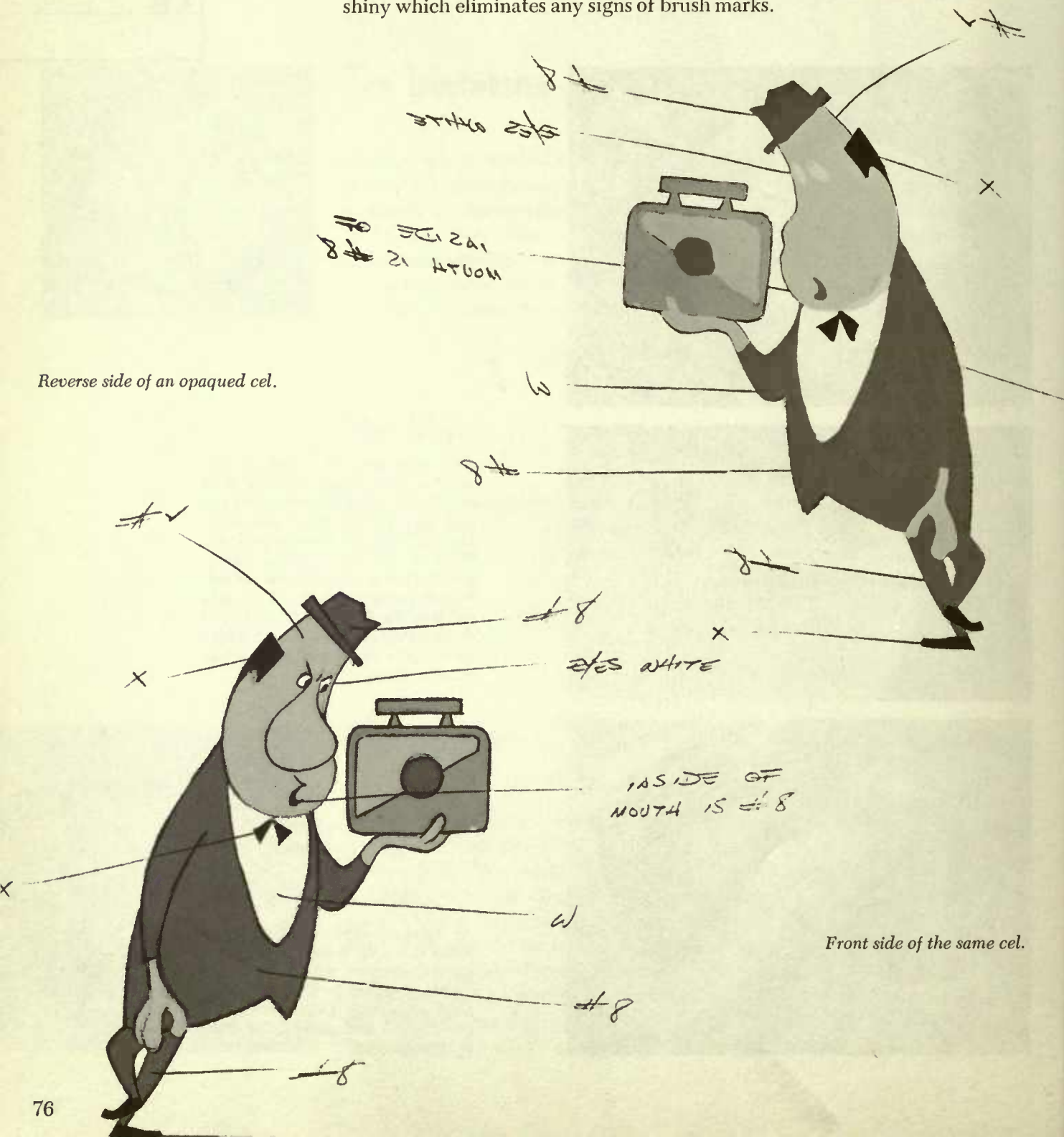
The pens and inks used by the inker. Pictured from top to bottom are the superflexible crow quill pen #62, used for fine lines; the Esterbrook #7628, for heavier lines; the #63 crow quill, for normal inking; and the #64 crow quill pen, for inking extremely fine lines. Black India ink is in the bottle on the left. The other bottle contains black opaque water color which is used for filling in larger areas.



An opaquer applying colors to an inked cel. A light beneath the glass insert on the animation board makes it easier for the opaquer to work accurately. On the table are the brushes and water colors used by the opaquer.

The opaquer does not work on the inked side of the cel but on the reverse side. He does this for two reasons: 1) It permits faster work because he does not have to worry about meeting the ink lines precisely—a slight overlapping on the reverse side does not show on the inked side; 2) the only way to avoid the crude appearance of visible brush marks is to opaque the reverse side; when the cel is turned over its surface makes the opaque look shiny which eliminates any signs of brush marks.

Reverse side of an opaqued cel.



Front side of the same cel.



Part IV

Filming

It is the animation camera and the optical printer that turn the hundreds of animation drawings into a smooth-flowing, modern, motion picture. The following pages introduce the reader to their highly technical photographic possibilities.

The Animation Camera

Certain names are synonymous with the artistic development of animation. Walt Disney, Max Fleischer, Paul Terry and others have contributed greatly toward making animated films the potent force they are today—a medium for amusement, education and commerce. No discussion relative to the development of the animation industry, however, could be considered complete without mentioning another pioneer, John Oxberry. Although Oxberry began in the animation industry as a cartoonist, he has been responsible for the development of much of the technical equipment in use today.

The artistic development of animation might never have progressed beyond the cradle stage without the mechanical and technical contributions of such men as John Oxberry. They taught the infant to crawl and then to walk. And today, thanks to the highly specialized animation equipment these men developed, the animation industry takes giant strides with modern production methods and effects unattainable a brief 25 years ago. In developing equipment to meet today's requirements, the design of all components was correlated in order to achieve maximum accuracy, versatility and speed in animation photography.

Close coordination of the functions of the animation stand, camera, stop-motion motor, and compound table—the movable working area on which the art work is placed—has always been the basic aim behind all design and redesign of equipment for animated-film production. From the outset, the goal has been a combination of the best ideas of the past with unique new ideas. This could be realized only by developing components that complemented one another in order to make maximum flexibility in over-all studio production possible.

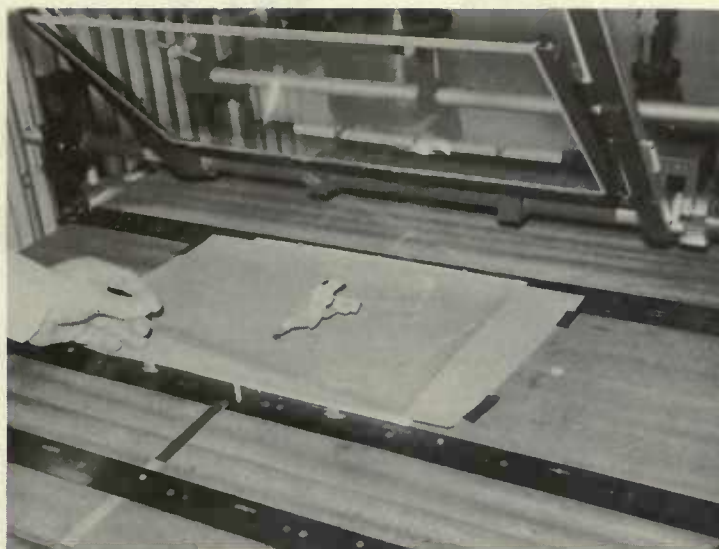
Because production of animated films depends, essentially, on accurate control of the movements of the camera and the art work, an important question was raised: Which movements should be assigned to the camera and which to the art work?

Sound engineering principles dictated that camera movements should be minimized since minor alignment errors are greatly magnified on film. Therefore, newly designed equipment confines camera movements to the vertical and allots all horizontal movements to the compound table top. This provides great latitude in mechanical design and opens countless new avenues for the director in planning animated sequences.

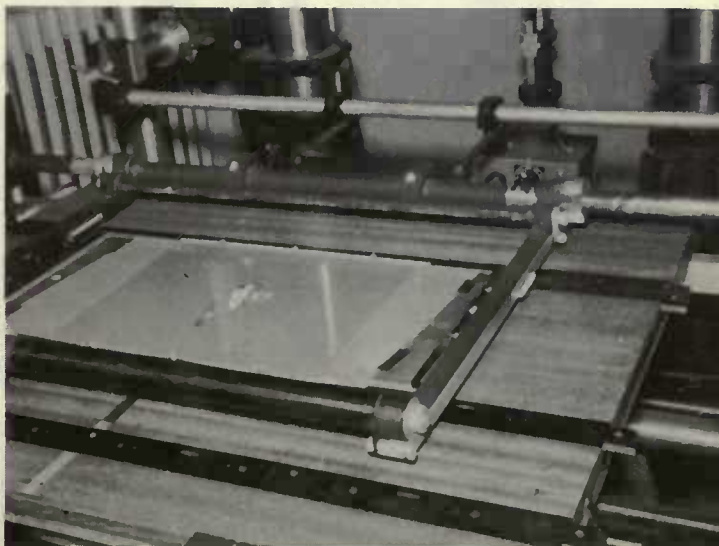


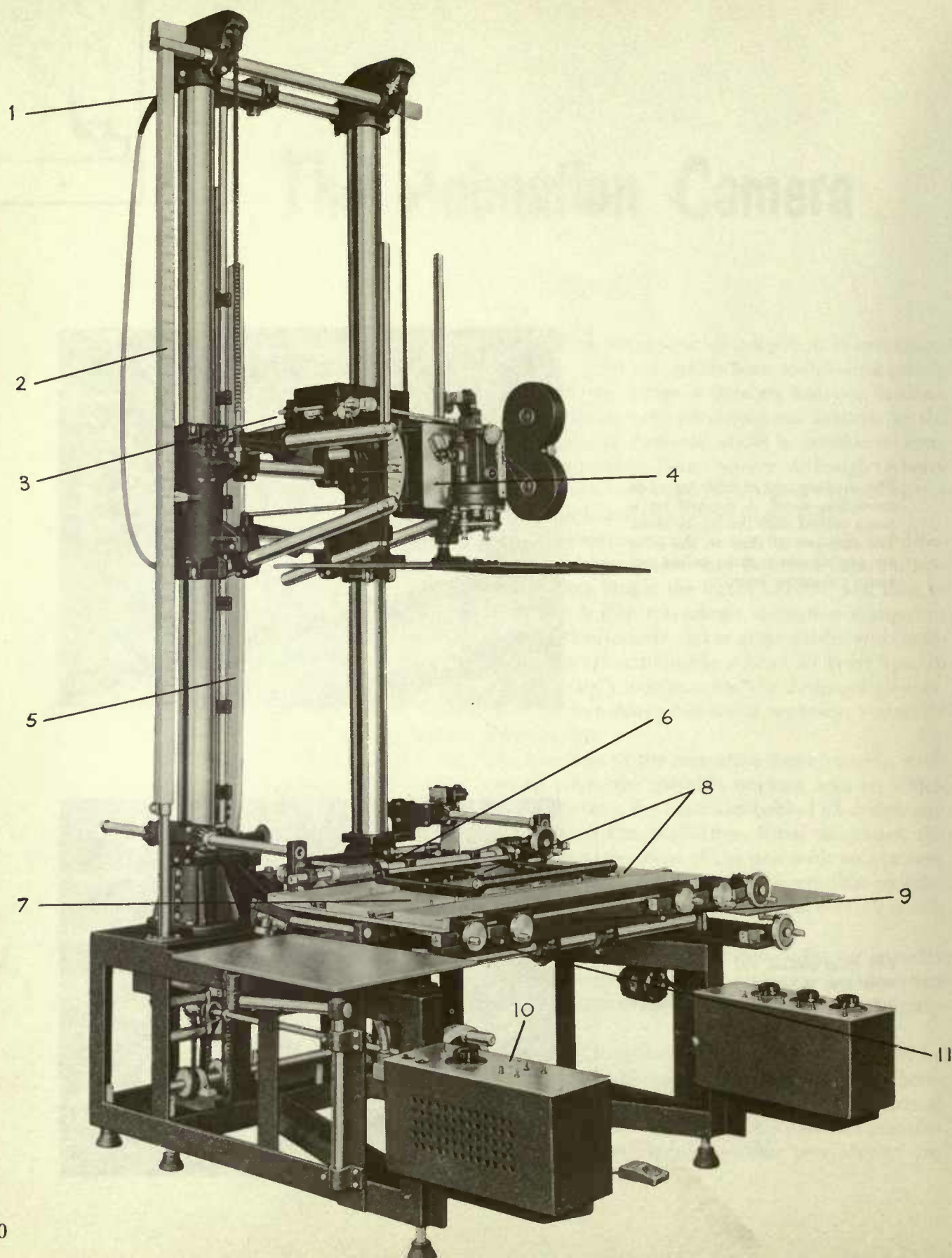
4

The working area or table top of an animation stand. A finished cel is being placed over the background. The two sets of pegs on the table top exactly match those on the animator's drawing board.



The glass platen, the frame of the table top, is now in shooting position and the art work is ready to be photographed.



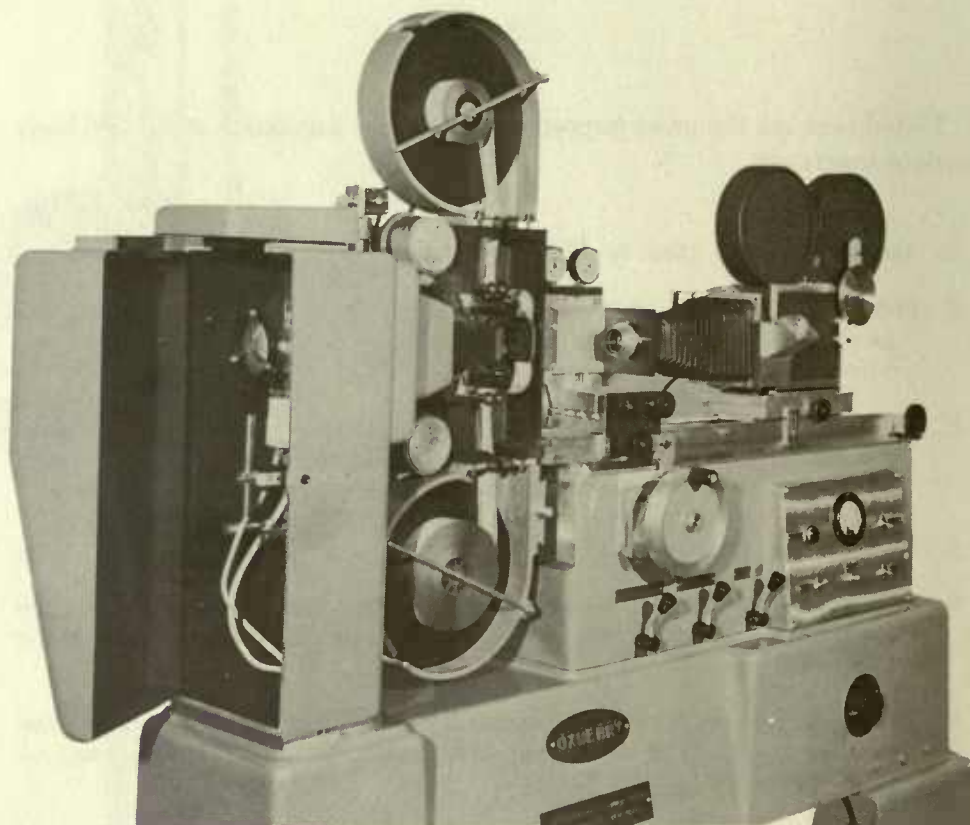




Listed here are the more important parts of the animation stand and their various functions:

1. Automatic cut-offs. These establish the extreme positions of the zoom mechanism.
2. Field-position bar. Numerical markings on this bar indicate the size of the area to be photographed. For example, a number 9 position would indicate a field size 9 inches wide.
3. Stop-motion mechanism. Although the camera mounted on the animation stand is a motion-picture camera, this specially constructed motor drive, a stop-motion mechanism, permits the cameraman to photograph one frame of film at a time.
4. The camera.
5. Follow focus cams. These cams automatically adjust focus, thereby relieving the cameraman of the tedious task of changing focus for each move in relation to the field-position bar.
6. Floating pegs. Because these pegs remain in a fixed position at all times, they give an accurate registry of the original table position regardless of any subsequent table movements.
7. The table top. The table top is the movable working area of the animation stand on which the art work is placed.
8. Traveling pegtracks. These tracks, top and bottom, enable the cameraman to move the art work or cels with a greater degree of accuracy. The two controls at the front of the table are attached to counters for more accurate positioning.
9. The compound table. The table top is set on the compound movement in such a way that any movement can be made, including the rotation of the table, without interfering with any of the other movements.
10. The control panel. A motorized unit that permits the cameraman to make table-top moves, spins and zooms by motor rather than by hand turning or cranking.
11. Split-nut control. This enables the cameraman to engage or disengage any of the compound movements so that the table can be moved freely by hand to any desired position.

The Optical Printer



The *optical printer* represents one of the most important developments in the motion-picture industry: photographic effects previously impossible to achieve. First cousin to the animation camera, which photographs art work, the optical printer photographs film. The printer is basically a projection head in sync with a motion-picture camera.

The optical cameraman can shoot the projected motion-picture film frame by frame to make an exact copy. Or he can enlarge or reduce portions of any frame during the copying process. In addition, he can further change the original film by eliminating frames or by repeating one frame.

An action, either live or animated, can be slowed down, speeded up or reversed. Reversing the film provides such laugh-producing effects as the swimmer returning to the diving board from the water.



Combining more than one piece of film is now a routine task for the cameraman. It is this technique that makes it possible to superimpose titles, originally shot on the animation stand, over live-action scenes.

One of the more important effects is the fading out of one scene and the fading in of another. When this occurs at the same time and place on a strip of film, it is known as a cross-dissolve.

Other possibilities are flip effects, where a still frame may go into a spin and eventually introduce an entirely new scene; wipes; and multiple-image shots.

It is not practical to list here all the effects that can be produced through use of the optical printer. They are limited only by the imaginations of the directors and film editors.



7

Part V

The GE Commercial

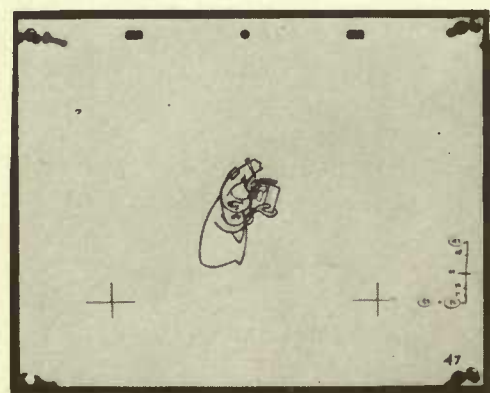
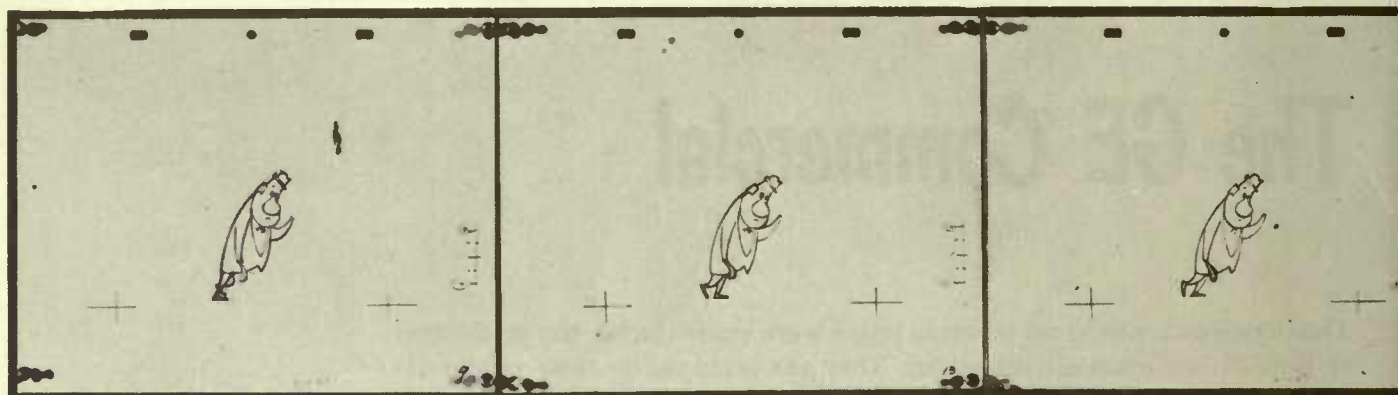
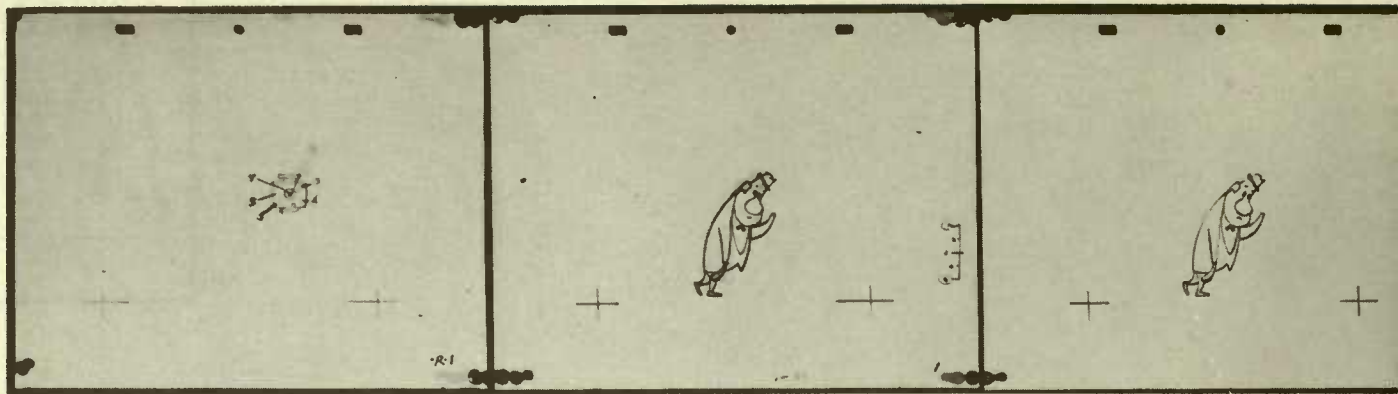
The animation of this one-minute commercial is discussed scene by scene. The exposure sheets and the important drawings are explained in detail in order to show how all elements of an animated film are brought together to form a unified whole.



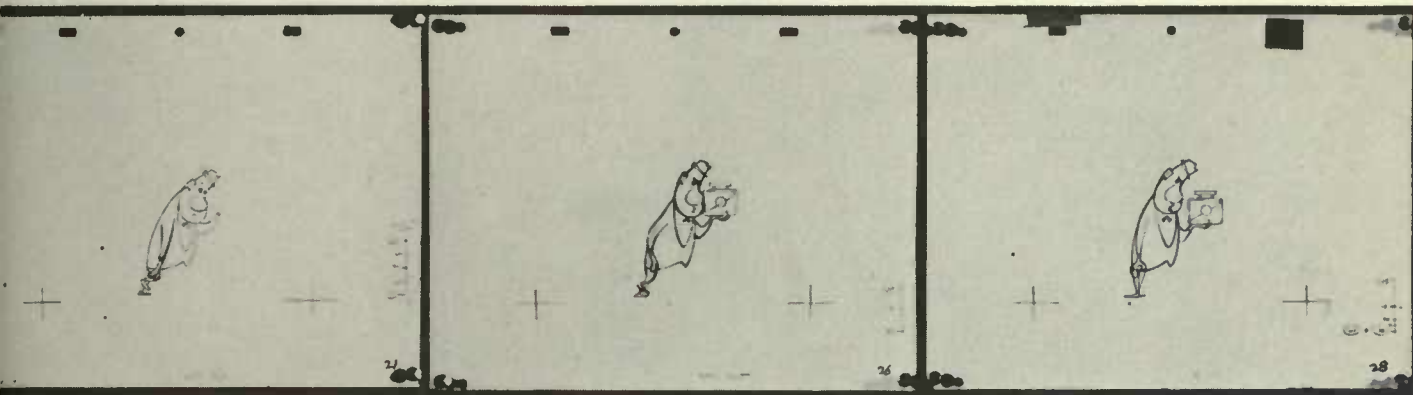
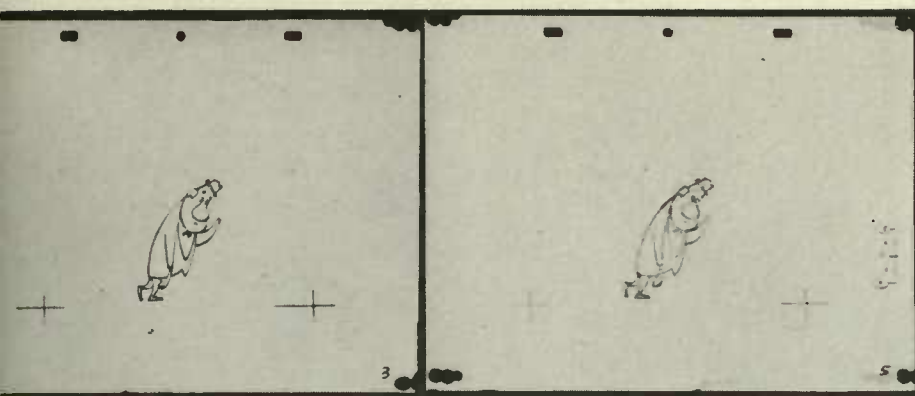
The GE Commercial

The drawings reproduced on these pages were made during the production of the GE one-minute commercial. They are arranged in their proper sequence as exposed (recorded) on the exposure sheets. Although most of them are the animator's extremes, some inbetween drawings are included to show how a particular action was developed. (The term "expose," as used in these pages, refers either to the process of photographing, that is, to *expose* a frame of film, or to the recording of cel numbers on exposure sheets in the sequence in which they will be photographed.)

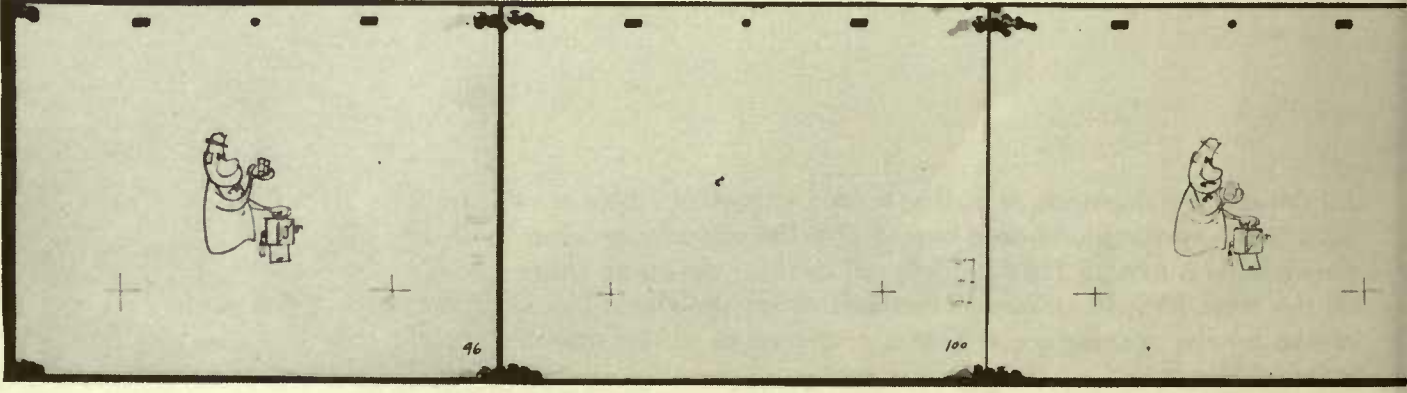
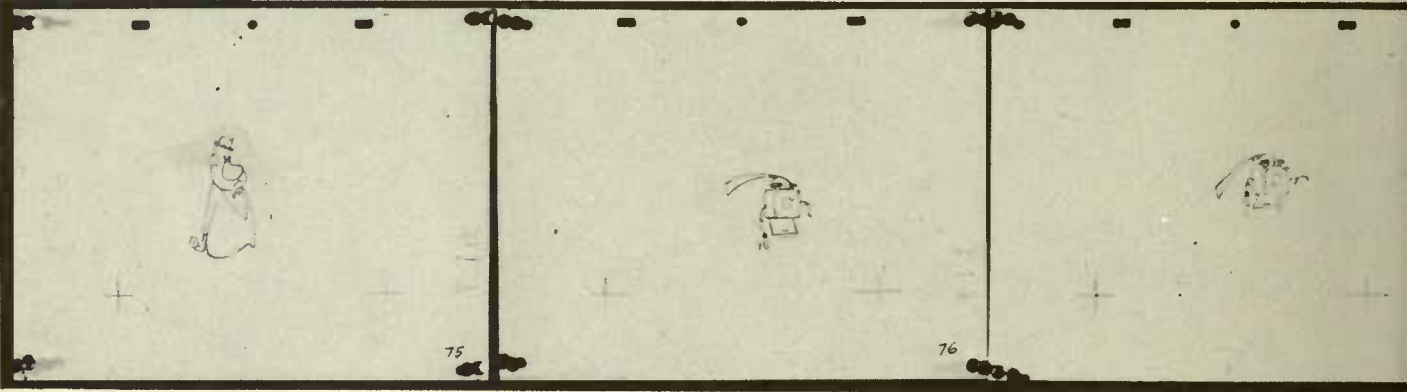
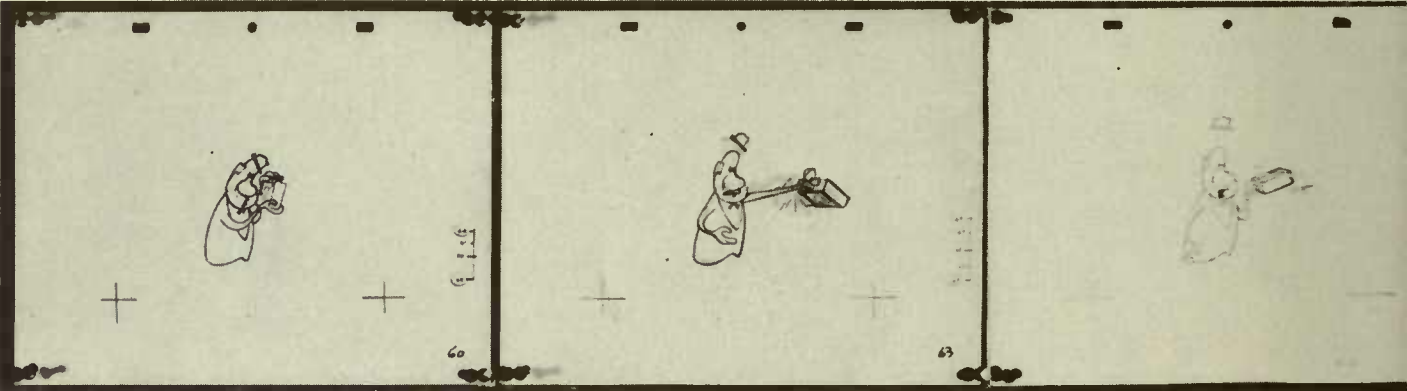
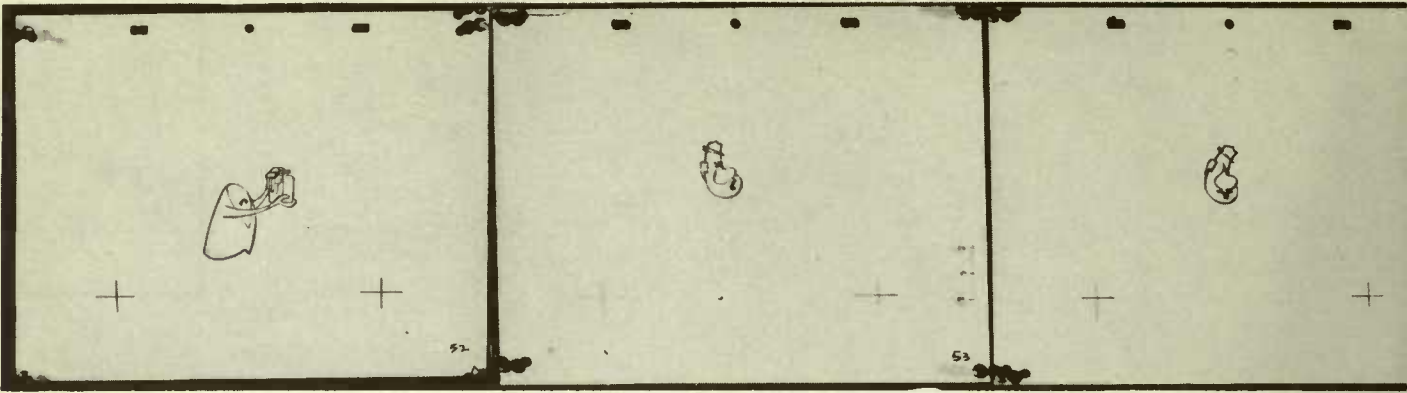
Exposure sheet #1 of Scene 1 shows that three cel levels are exposed over the background. One of these cel levels, the blank cel, is exposed in order to keep a uniform density over the background throughout the scene. The blank cels were indicated on the exposure sheets by the animator after he had exposed (recorded) all the cels to be photographed and found the cel levels inconsistent.

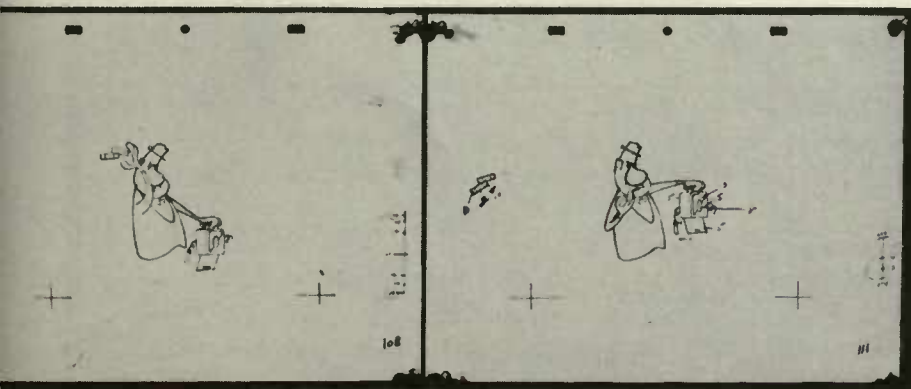
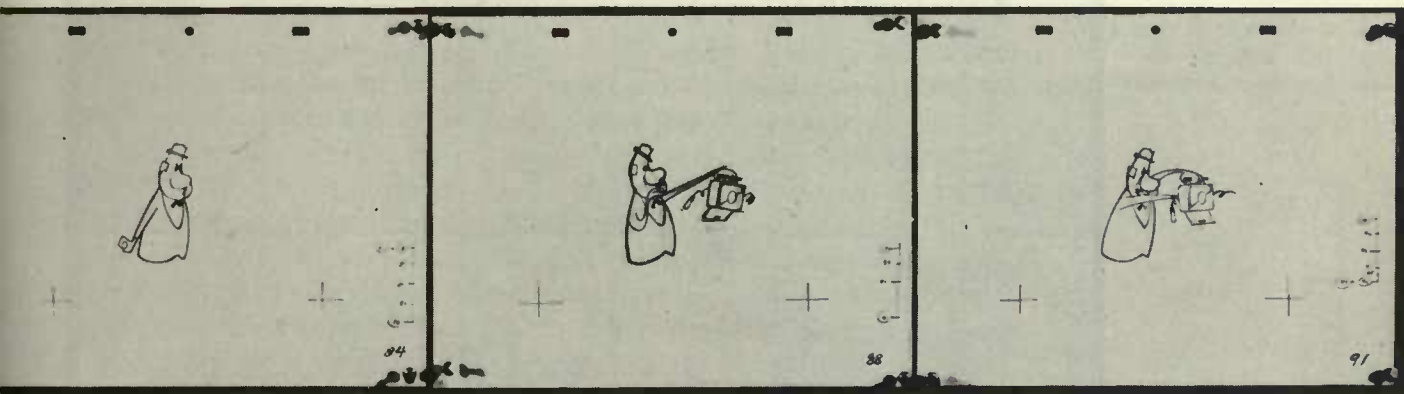
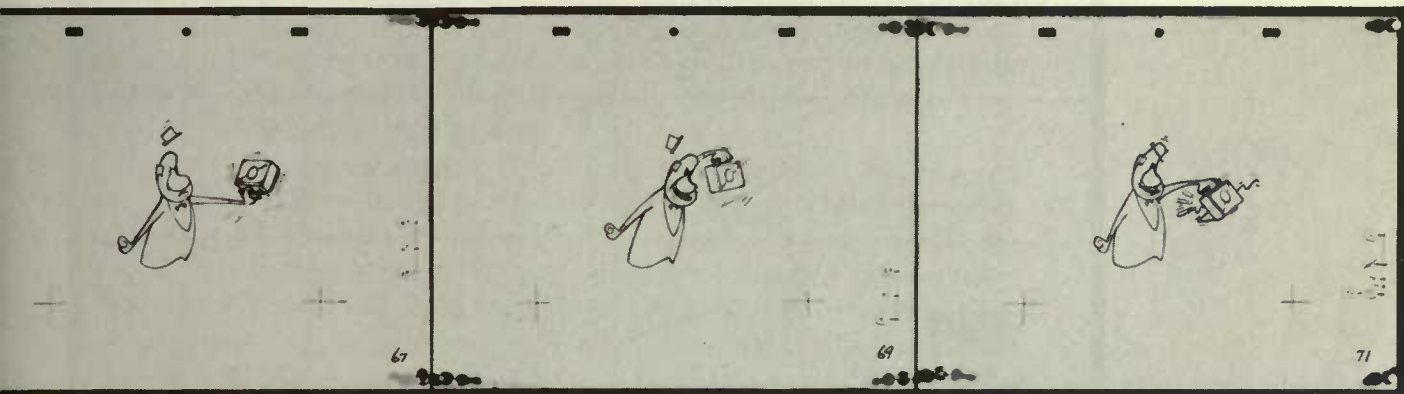
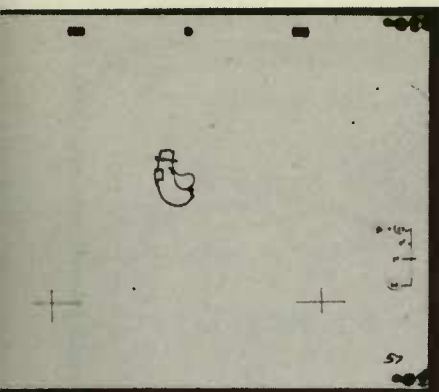


Scene 1



All the extreme drawings, as well as several important inbetween drawings, used in the opening animation sequence of the one-minute commercial are shown here. A total of 114 drawings was used for the entire Scene 1 action. Of this total, 35 were animator's extremes or key drawings. The 229 frames of film for the opening scene have a projection or screen time of approximately 9½ seconds.





Exposure sheet 1, Scene 1.

SCENE NO.		CLIENT	PHOTOGRAPH NAME	NO.	SCENE	FOOTAGE	SHEET NO.	TOTAL SHEETS
5847		G.E. RADIO	HD WIMPLE (OPENING)		1		1	5
STORIES: ANIMATOR: ASSISTANT:								
<div style="float: right; border: 1px solid black; padding: 5px; margin-top: 10px;"> START AT 99968 ON 1000000 </div>								
DIAL	TRACK	ACTION	DIAL	REEL	LENS	RADIO	WIND	DIAL
1			1	PAN. BKS A	1	21	1	1
2			2		2	21	2	2
3			3		3	21	3	3
4			4		4	21	4	4
5			5		5	21	5	5
6			6		6	21	6	6
7			7		7	21	7	7
8			8		8	21	8	8
9			9		9	21	9	9
10			10		10	21	10	10
11			11		11	21	11	11
12			12		12	21	12	12
13			13		13	21	13	13
14			14		14	21	14	14
15			15		15	21	15	15
16			16		16	21	16	16
17			17		17	21	17	17
18			18		18	21	18	18
19			19		19	21	19	19
20			20		20	21	20	20
21			21		21	21	21	21
22			22		22	21	22	22
23			23		23	21	23	23
24			24		24	21	24	24
25			25		25	21	25	25
26			26		26	21	26	26
27			27		27	21	27	27
28			28		28	21	28	28
29			29		29	21	29	29
30			30		30	21	30	30
31			31		31	21	31	31
32			32		32	21	32	32
33			33		33	21	33	33
34			34		34	21	34	34
35			35		35	21	35	35
36			36		36	21	36	36
37			37		37	21	37	37
38			38		38	21	38	38
39			39		39	21	39	39
40			40		40	21	40	40
41			41		41	21	41	41
42			42		42	21	42	42
43			43		43	21	43	43
44			44		44	21	44	44
45			45		45	21	45	45
46			46		46	21	46	46
47			47		47	21	47	47
48			48		48	21	48	48
49			49		49	21	49	49
50			50		50	21	50	50
51			51		51	21	51	51
52			52		52	21	52	52
53			53		53	21	53	53
54			54		54	21	54	54



Column 4 of exposure sheet #1, shows a series of drawings numbered from 1 to 24. These drawings make up the cycle of Mr. Wimple walking. The twenty-four drawings actually combine to make only two steps; however, drawing 1 has been animated so that it hooks up with drawing 24 to start the cycle over again. By repeating the cycle, it is possible to show Mr. Wimple walking. In fact, by using the same twenty-four drawings over and over again, he could be kept walking for the entire length of the one-minute commercial, or indefinitely for that matter.

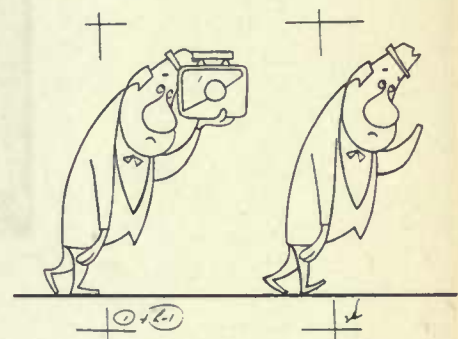
Column 3 on exposure sheet #1 shows a hold cel numbered R-1 exposed along with the walk cycle. Cel R-1 is Mr. Wimple's hand holding the radio. The drawing for this cel was designed by the animator to match any of the twenty-four drawings in the walk cycle, thereby eliminating the necessity of retracing the hand and radio on each of the twenty-four drawings. Continuous retracing of the hand and radio might have resulted in uneven ink lines which produce a jiggling effect when seen on the screen. Through the use of R-1, the hold cel, this possibility was avoided.

For this twenty-four-drawing cycle, the animator drew the hold cel, R-1, and extreme drawings 1, 5, 9, 13, 17 and 21. Drawings 2, 3, and 4, shown in the accompanying illustrations, were made by the inbetweener, as were the remainder of the drawings of the repeat cycle which are not shown here.

The animator's notes on the right-hand side of the extreme drawings are guides for the spacing of the inbetweener's drawings. Compare the spacing notes on the repeat cycle of the walk with the spacing called for by the animator on drawing 28 where the walk cycle has ended and the cartoon character has begun to slow down before coming to a full stop. As can be seen on the spacing chart on drawing 28, the inbetweened drawing 29 is evenly spaced between extreme 28 and the combination of two other extremes, 32 and L-1. The next inbetweened drawing, 30, is evenly spaced between drawing 29 and extremes 32 and L-1, as is drawing 31. The animator, by means of this spacing, has slowed down his action to the desired smooth and well-timed stop.

In the column under "Action," the animator has written a brief description of the animation alongside the corresponding drawings. For this portion of the scene, the animator has simply indicated, "Mr. Wimple walking along—radio to ear."

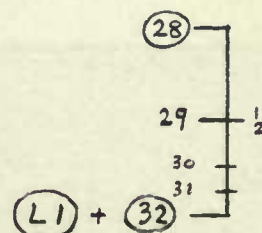
With Mr. Wimple at a full stop, the animator has again made use of the hold cel. This time, a separate drawing, L-1, has been made combining Wimple's legs and feet. No matter what the cartoon character's head and body actions may be, the inker will not have to trace Mr. Wimple's legs and feet on any drawings for the length of time he remains in a static pose.



They have been drawn so that they can hook up and thereby make repetition of the cycle possible.



Spacing guide for the walk cycle.



Spacing guide for drawings 28-32.

PROD. NO.		CLIENT	PICTURE NAME		NO.	SCENE	FOOTAGE	SHEET NO.	NO. SHEETS
5847		G.E. RADIO	MR. WIMPLE			1		1.	5
STORY:		(OPENING)							
ANIMATOR:									
ASSISTANT:									
DIAL	TRACK	ACTION	DIAL	RECORDED	1	2	3	4	DIAL
1			1	DR.	1	2	3	4	1
2			2		1	2	3	4	2
3			3		1	2	3	4	3
4			4		1	2	3	4	4
5			5		1	2	3	4	5
6			6		1	2	3	4	6
7			7		1	2	3	4	7
8			8		1	2	3	4	8
9			9		1	2	3	4	9
10			10		1	2	3	4	10
11			11		1	2	3	4	11
12			12		1	2	3	4	12
13			13		1	2	3	4	13
14			14		1	2	3	4	14
15			15		1	2	3	4	15
16			16		1	2	3	4	16
17			17		1	2	3	4	17
18			18		1	2	3	4	18
19			19		1	2	3	4	19
20			20		1	2	3	4	20
21			21		1	2	3	4	21
22			22		1	2	3	4	22
23			23		1	2	3	4	23
24			24		1	2	3	4	24
25			25		1	2	3	4	25
26			26		1	2	3	4	26
27			27		1	2	3	4	27
28			28		1	2	3	4	28
29			29		1	2	3	4	29
30			30		1	2	3	4	30
31			31		1	2	3	4	31
32			32		1	2	3	4	32
33			33		1	2	3	4	33
34			34		1	2	3	4	34
35			35		1	2	3	4	35
36			36		1	2	3	4	36
37			37		1	2	3	4	37
38			38		1	2	3	4	38
39			39		1	2	3	4	39
40			40		1	2	3	4	40
41			41		1	2	3	4	41
42			42		1	2	3	4	42
43			43		1	2	3	4	43
44			44		1	2	3	4	44
45			45		1	2	3	4	45
46			46		1	2	3	4	46
47			47		1	2	3	4	47
48			48		1	2	3	4	48
49			49		1	2	3	4	49
50			50		1	2	3	4	50
51			51		1	2	3	4	51
52			52		1	2	3	4	52
53			53		1	2	3	4	53
54			54		1	2	3	4	54
55			55		1	2	3	4	55
56			56		1	2	3	4	56
57			57		1	2	3	4	57
58			58		1	2	3	4	58
59			59		1	2	3	4	59
60			60		1	2	3	4	60

Handwritten notes: "H. TO 5847", "ANIMATION STAND NO.", "PAU MOVES", "START AT 99968 ON 5847", "LOOK!", "L1", "B1", "B2", "B3", "B4", "B5", "B6", "B7", "B8", "B9", "B10", "B11", "B12", "B13", "B14", "B15", "B16", "B17", "B18", "B19", "B20", "B21", "B22", "B23", "B24", "B25", "B26", "B27", "B28", "B29", "B30", "B31", "B32", "B33", "B34", "B35", "B36", "B37", "B38", "B39", "B40", "B41", "B42", "B43", "B44", "B45", "B46", "B47", "B48", "B49", "B50", "B51", "B52", "B53", "B54", "B55", "B56", "B57", "B58", "B59", "B60".

Bottom of exposure sheet 1, Scene 1.

Top of exposure sheet 2, Scene 1.

PROD. NO.		CLIENT	PICTURE NAME		NO.	SCENE	FOOTAGE	SHEET NO.	NO. SHEETS
5847		G.E. RADIO	MR. WIMPLE			1		2.	5
STORY:		(OPENING)							
ANIMATOR:									
ASSISTANT:									
DIAL	TRACK	ACTION	DIAL	RECORDED	1	2	3	4	DIAL
1			1	B1G (L)	1	2	3	4	1
2			2		1	2	3	4	2
3			3		1	2	3	4	3
4			4		1	2	3	4	4
5			5		1	2	3	4	5
6			6		1	2	3	4	6
7			7		1	2	3	4	7
8			8		1	2	3	4	8
9			9		1	2	3	4	9
10			10		1	2	3	4	10
11			11		1	2	3	4	11
12			12		1	2	3	4	12
13			13		1	2	3	4	13
14			14		1	2	3	4	14
15			15		1	2	3	4	15
16			16		1	2	3	4	16
17			17		1	2	3	4	17
18			18		1	2	3	4	18
19			19		1	2	3	4	19
20			20		1	2	3	4	20
21			21		1	2	3	4	21
22			22		1	2	3	4	22
23			23		1	2	3	4	23
24			24		1	2	3	4	24
25			25		1	2	3	4	25
26			26		1	2	3	4	26
27			27		1	2	3	4	27
28			28		1	2	3	4	28
29			29		1	2	3	4	29
30			30		1	2	3	4	30
31			31		1	2	3	4	31
32			32		1	2	3	4	32
33			33		1	2	3	4	33
34			34		1	2	3	4	34
35			35		1	2	3	4	35
36			36		1	2	3	4	36
37			37		1	2	3	4	37
38			38		1	2	3	4	38
39			39		1	2	3	4	39
40			40		1	2	3	4	40
41			41		1	2	3	4	41
42			42		1	2	3	4	42
43			43		1	2	3	4	43
44			44		1	2	3	4	44
45			45		1	2	3	4	45
46			46		1	2	3	4	46
47			47		1	2	3	4	47
48			48		1	2	3	4	48
49			49		1	2	3	4	49
50			50		1	2	3	4	50
51			51		1	2	3	4	51
52			52		1	2	3	4	52
53			53		1	2	3	4	53
54			54		1	2	3	4	54
55			55		1	2	3	4	55
56			56		1	2	3	4	56
57			57		1	2	3	4	57
58			58		1	2	3	4	58
59			59		1	2	3	4	59
60			60		1	2	3	4	60

Handwritten notes: "H. TO 5847", "ANIMATION STAND NO.", "PAU MOVES", "START AT 99968 ON 5847", "LOOK!", "L1", "B1", "B2", "B3", "B4", "B5", "B6", "B7", "B8", "B9", "B10", "B11", "B12", "B13", "B14", "B15", "B16", "B17", "B18", "B19", "B20", "B21", "B22", "B23", "B24", "B25", "B26", "B27", "B28", "B29", "B30", "B31", "B32", "B33", "B34", "B35", "B36", "B37", "B38", "B39", "B40", "B41", "B42", "B43", "B44", "B45", "B46", "B47", "B48", "B49", "B50", "B51", "B52", "B53", "B54", "B55", "B56", "B57", "B58", "B59", "B60".

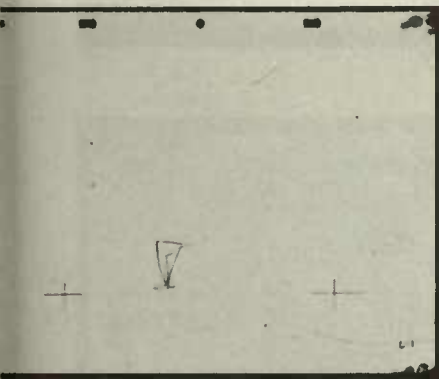
The column under the word "Track" contains the sound-track dialogue, as analyzed by the film editor. At frame 60 on exposure sheet #1 (for frame numbers, look at the column under "Dial"), our cartoon hero makes his first sound, a history making "Oh, Pooh!" Up to this point, with the exception of a musical beat during the walk cycle, the animator had not been concerned with any sound track sync. Mr. Wimple had remained silent while listening to the radio he held in his hand. For the length of the walk cycle, the accompanying music on the sound track was full of static and rather annoying, to give contrast to the fine tone and dependability of the GE transistor radio shown later in the one-minute commercial.

At drawing 52, Mr. Wimple's head is the only part of the cartoon character still animating. As in the case of hold cels R-1 and L-1 used previously, drawing 52 is also made to be used as a hold cel on a separate level.

The reason for exposing a blank cel at the beginning of the scene now becomes obvious, since, at this point, all three cel levels are being used. Column 1, which would have been used if the animator had needed four levels at any time during the scene, remains empty on the exposure sheets. Column 2 lists L-1, the cel with Wimple's legs. The hold cel of Mr. Wimple's body, drawing 52, is in column 3, while column 4 lists the head and mouth actions.

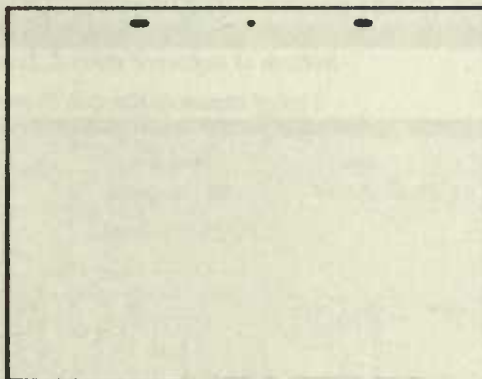


Col. 2 on exposure sheet (legs).



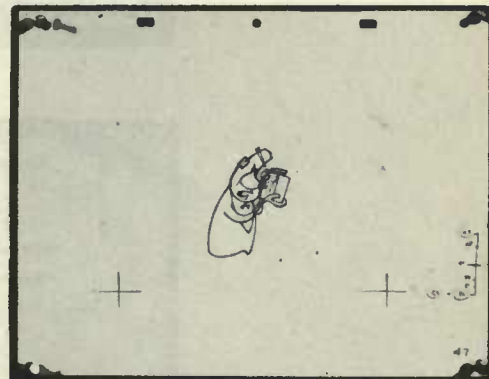
L-1, drawing for hold cel.

Col. 3 on exposure sheet (radio).

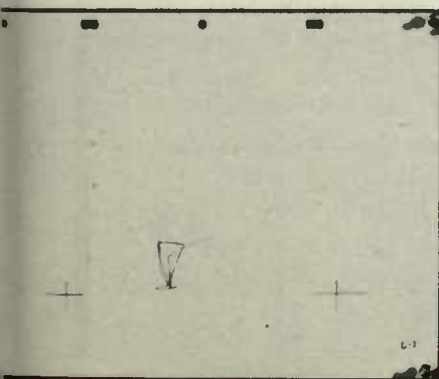


Blank cel inserted to keep color tones consistent throughout the scene.

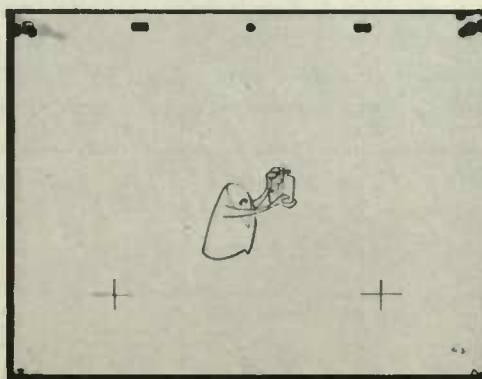
Col. 4 on exposure sheet (Wimple).



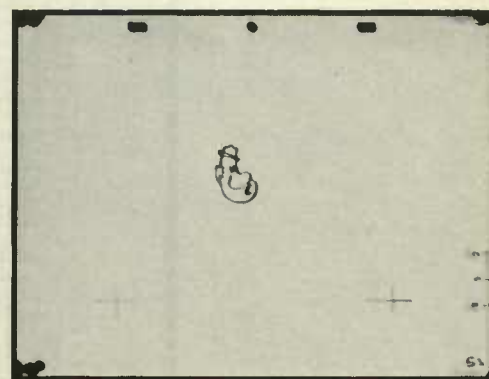
47, drawing for action cel.



L-1, drawing for hold cel of legs.



52, drawing for hold cel of body and radio.



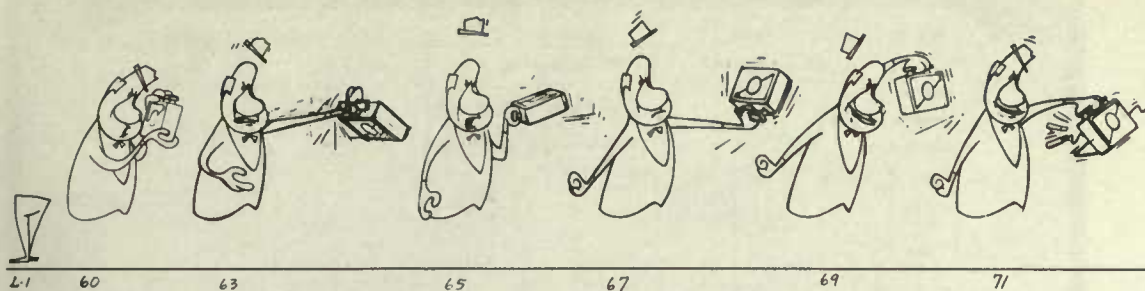
53, drawing for action cel of head.

PROD. NO.	CLIENT	PICTURE NAME	NO.	SCENE	FOOTAGE	SHEET NO.	NO.		
5847	G.E. RADIO	MR. WIMPLE	1			2.	5		
STORYBOARD:	(OPENING)			ANIMATION STAND NO.					
ANIMATOR:									
ASSISTANT:									
DIAL	TRACK	ACTION	DIAL	SECS.	1	2	3	4	DIAL
6									
7									
8									
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10									
11									
12									
13									
14									
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100									

Bottom of exposure sheet 2, Scene 1.

Top of exposure sheet 3, Scene 1.

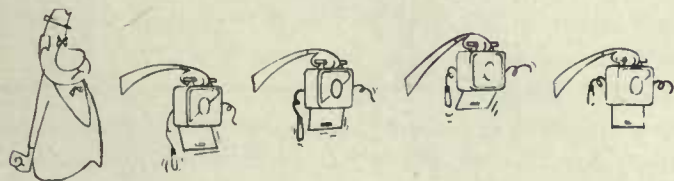
PROD. NO.	CLIENT	PICTURE NAME	NO.	SCENE	FOOTAGE	SHEET NO.	NO. SHEETS		
5847	G.E. RADIO	MR. WIMPLE	122			3	5		
STORYBOARD:		(OPENING)			ANIMATION STAND NO.				
ANIMATOR:									
ASSISTANT:									
DIAL	TRACK	ACTION	DIAL	SECS.	1	2	3	4	DIAL
1			1	82.0		1.1	7.8	7.5	16.1
2			2				7.9		3
3			3						3
4			4				8.0		3
5			5						3
6			6				8.1		3
7			7						7
8			8						3
9			9						17.0
10			10						1
11			11				8.2		3
12			12						3
13			13				8.3		4
14			14						3
15			15				8.4		17.0
16			16						7
17			17						8
18			18				8.5		18.0
19			19						1
20			20				8.6		3
21			21						3
22			22				8.7		3
23			23						3
24			24				8.8		3
25			25						3
26			26				8.9		3
27			27						3
28			28						3
29			29						3
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94			94						3
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96			96						3
97			97						3
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99			99						3
100			100						3



Beginning with drawing 60, Mr. Wimple's body is no longer in a stationary pose. Therefore drawing 52, the hold cel of the body, is replaced with a blank cel in order to keep the number of levels used over the background at three.

At this point of the opening scene, Mr. Wimple is quite angry. The sound-track column shows him saying: "What's the matter with you, you little beast?" This speech is, of course, directed at the old radio model he has been holding.

Drawings 60 through 71 show Mr. Wimple shaking the radio angrily. Beginning with drawing 75, the violent shaking of the radio has subsided. Mr. Wimple's body, drawing 75, becomes a hold cel and only the arm holding the radio continues animating.



Up to this point, the hold cels have been exposed on the lower levels, those closest to the background. The hold cel of the body, drawing 75, however, is exposed on the top level so that the arm holding the radio does not have to be matched to the body. The drawing of the arm is extended beyond the line of the body so that the hold cel of the body covers the area which otherwise would have had to be matched. If hold cel 75 had been exposed on the third level, drawings 76 through 81 would all have had to be matched to hold cel 75. Drawing 81, the last of the arm-movement drawings, would also have had to be retraced and matched to each of the three drawings of Wimple's body following hold cel 75.

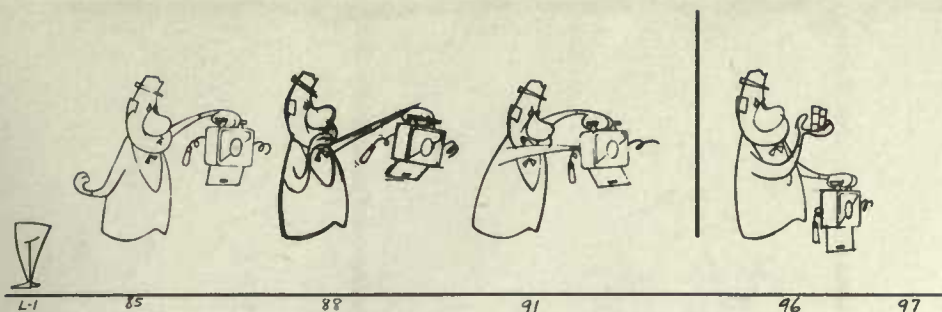
ROLL NO.	COLOR	CLIENT	PICTURE NAME	NO.	SCENE	FOOTAGE	SHEET NO.	NO. SURTS
5847		G.E. RADIO	MR. WINDLE	122			3	5

(OPENING)

STORYLINE:
ANIMATION:
ASSISTANT:

ANIMATION STAFF NO.

ROLL	TAKE	ACTION	DIAL	REMARKS	TIME	FIELD	P.P.C.
1	↑						
2	ADD BX						
3	↓						
4							
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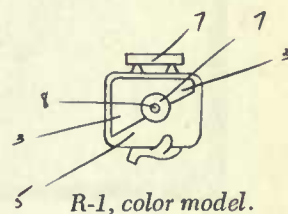
Beginning with drawing 85, Mr. Wimble reaches into the radio and removes the batteries. On the sound track, at frame 176 of exposure sheet #3, the cartoon character begins to speak again. He says: "Your batteries are dead again." These five words of dialogue require forty-seven frames, continuing to frame 223 of exposure sheet #3.

Attention is directed, at this point, to the dialogue spelling on the "Track" column of the exposure sheet. This is not an example of poor spelling by the animator. These words were spelled phonetically, as they sounded on the sound track, in order to indicate the basic sounds and syllables to be accented and emphasized in the animation of the lip movements. The sounds were indicated at the exact frames where they occur.

Mr. Wimble, having removed the batteries from the radio, is in a still position at drawing 96, and a hold cel is made of that static pose. Only his mouth is animating in drawings 97 through 102. At the end of his little speech, Wimble looks down at the dead batteries he is holding and throws them over his shoulder and out of the scene.

With the exception of the walk cycle at the beginning, Mr. Wimble's legs, drawing L-1, have been held in a still position throughout the scene, resulting in a saving of many hours of needless retracing and opaquing by the inker and colorer. The other hold cels used in various places throughout the scene have added to the great saving in production time and costs.

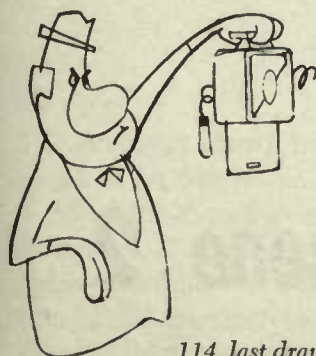
The lines and numbers on model drawings R-1, L-1 and 111 indicate the colors to be used by the opaquer in coloring the various areas of the cels. These colors, black, white and shades of gray, are selected by the animation director and layout man after several sample cels have been opaqued and tried out over the background to be used with the scene.



R-1, color model.



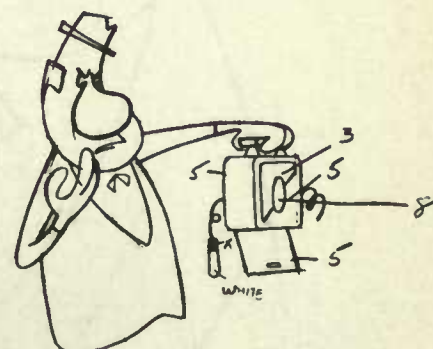
L-1, color model.

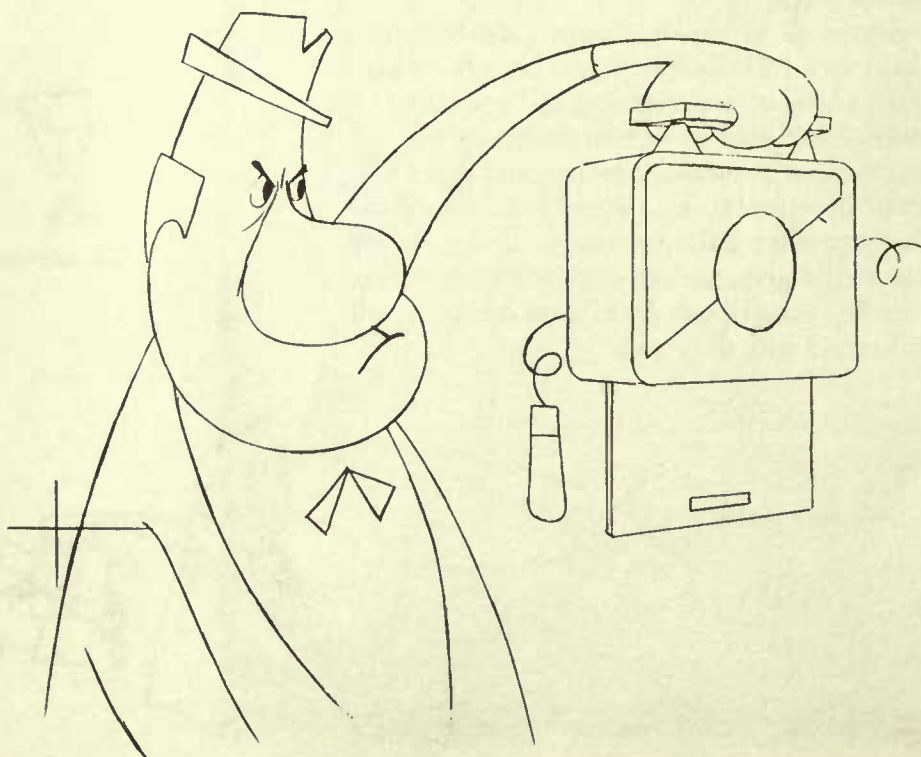
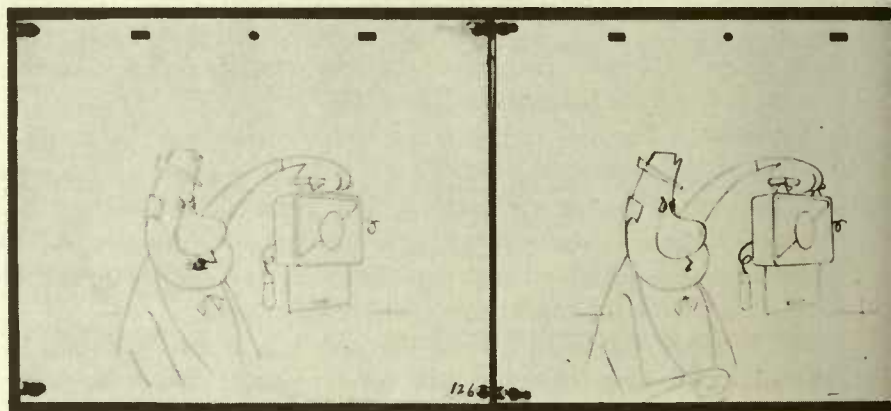
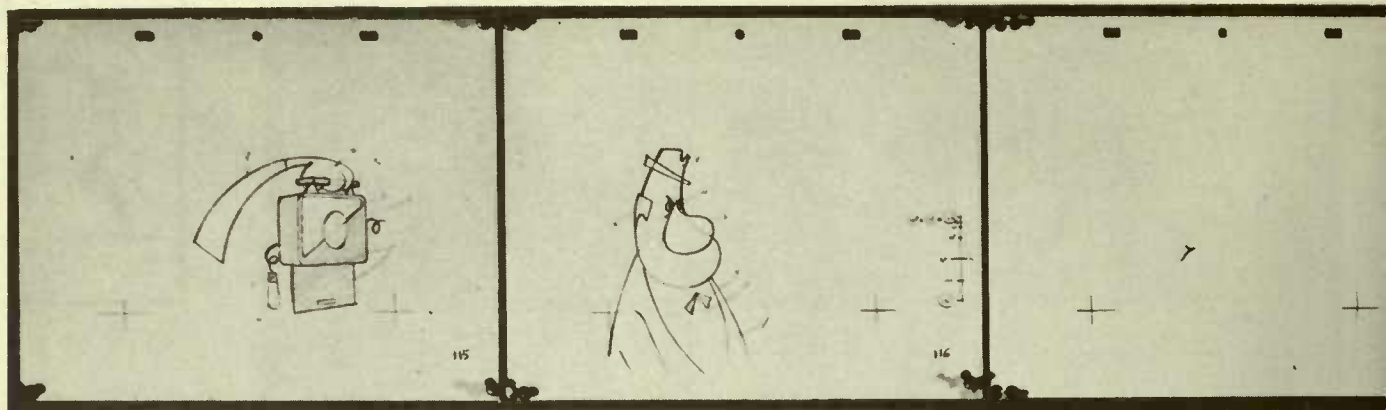


114, last drawing of Scene 1.

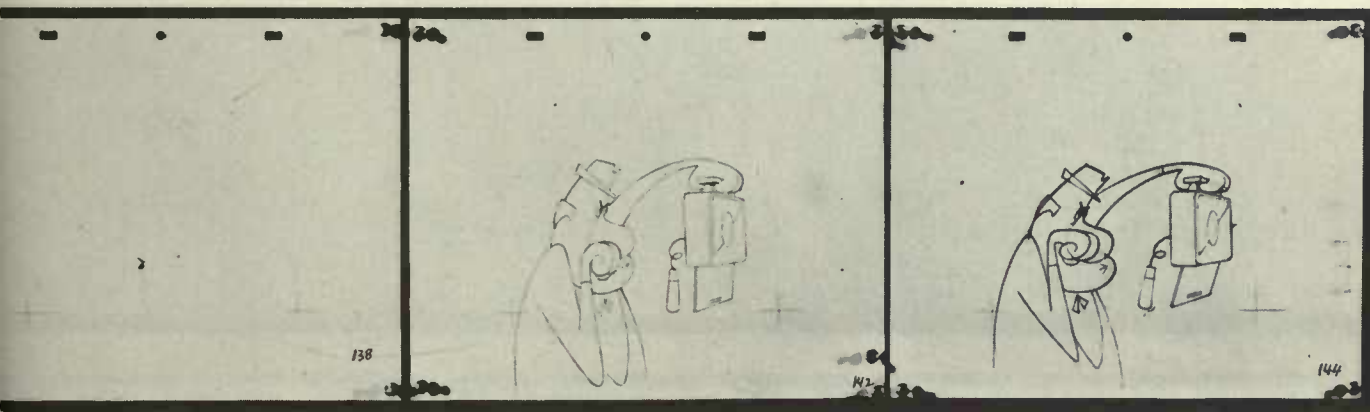
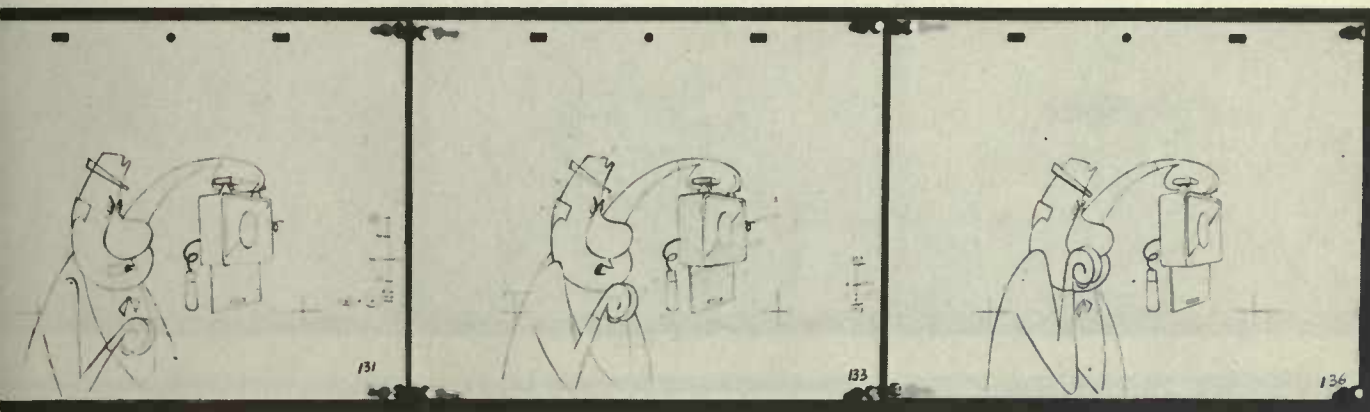
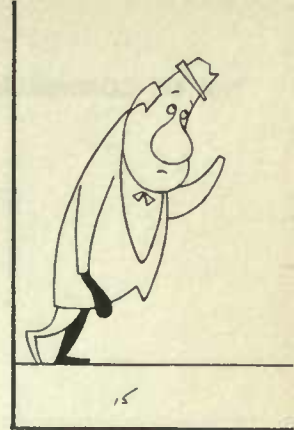
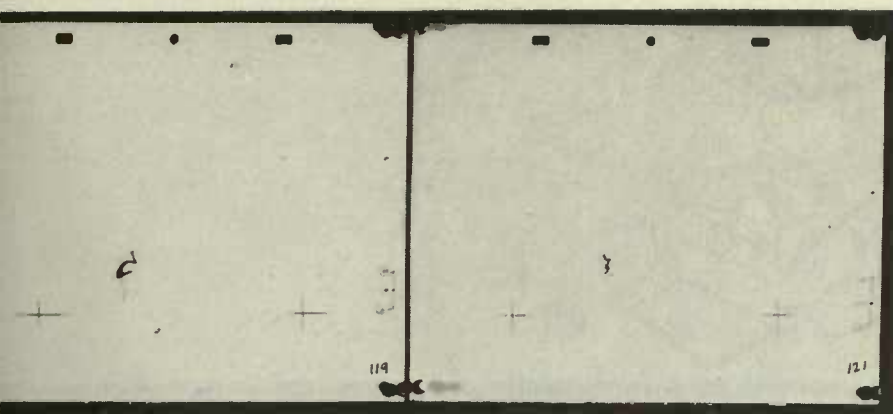


111, color model.



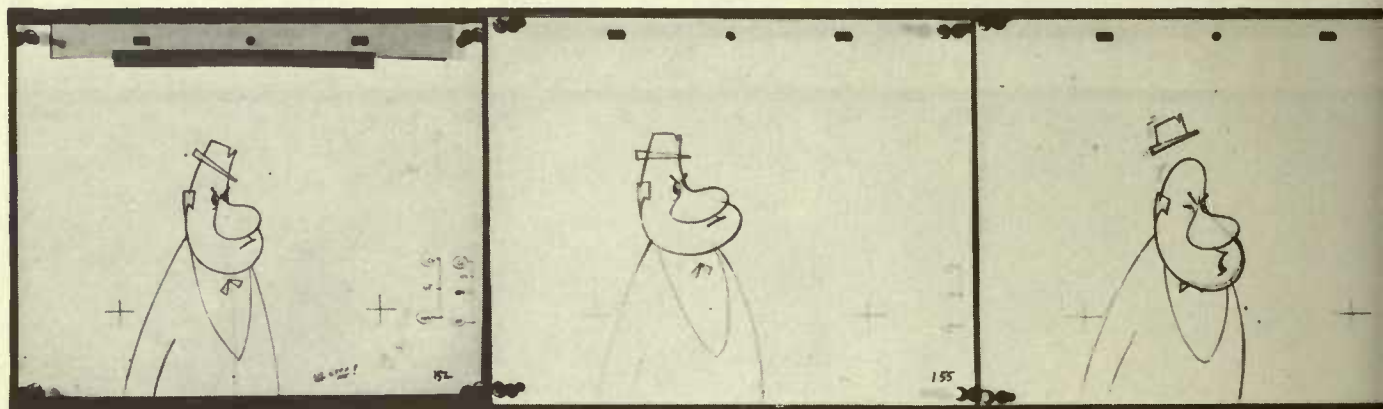
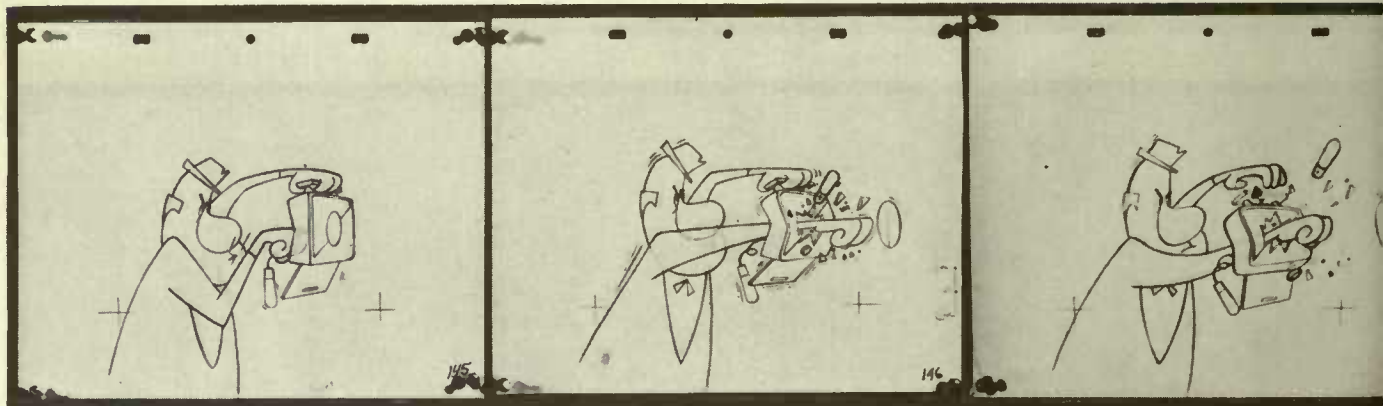


Scene 2



The drawings shown here are from Scene 2. The total number of drawings required for this scene, including the animator's extremes, was 60.

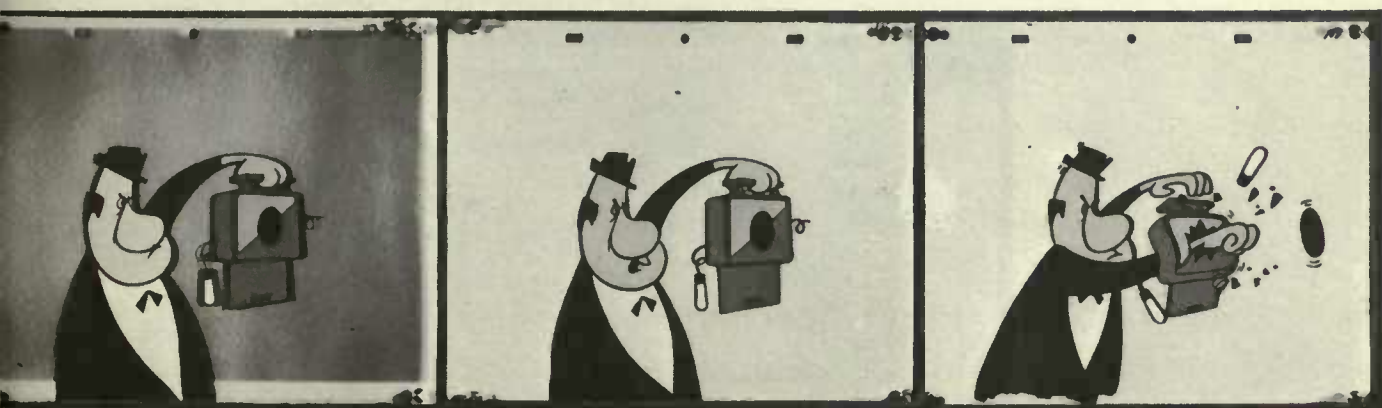
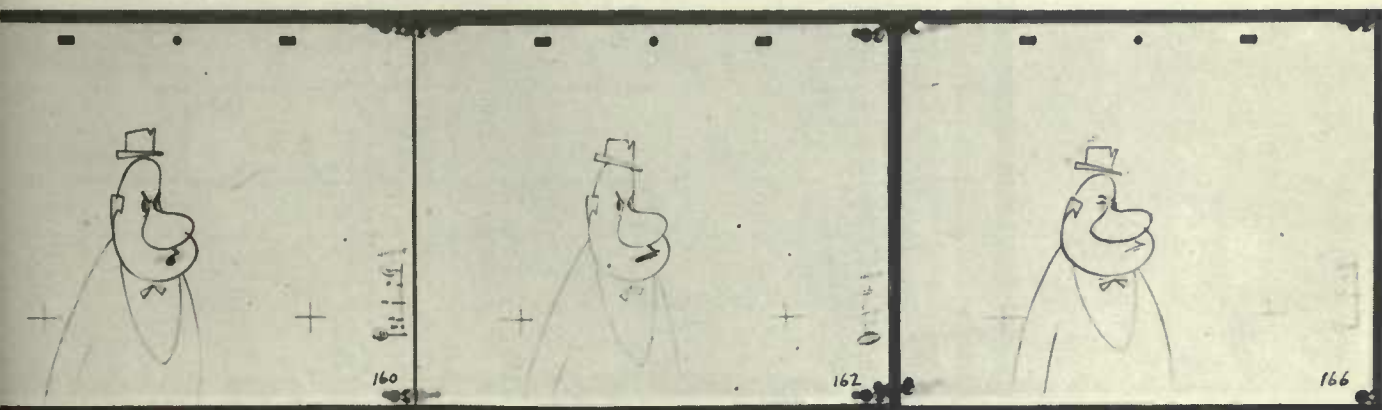
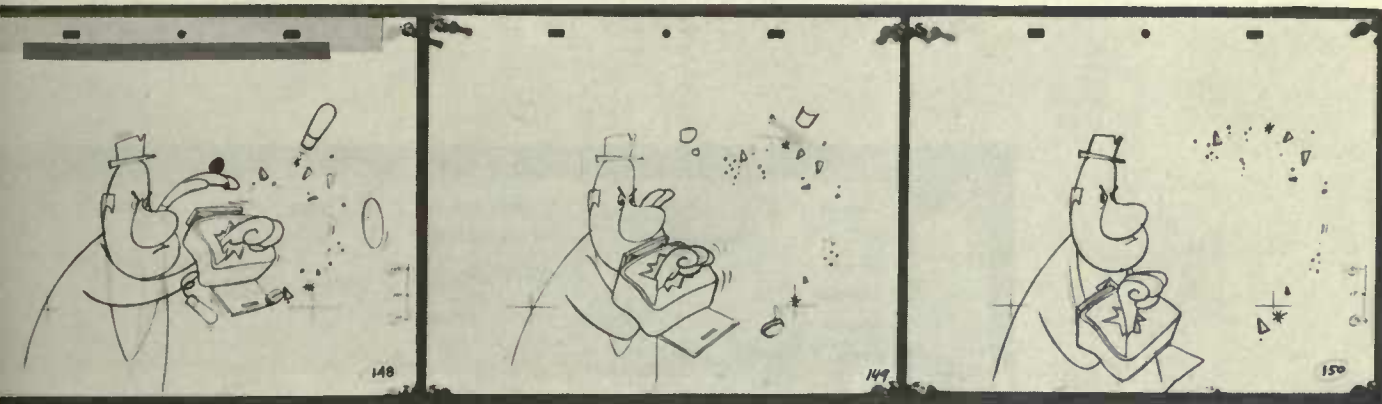
All of the drawings required for the entire opening animation sequence, Scenes 1 and 2, covering 24 feet of film, totaled 174. At the end of this second scene of animation, there is an optical cross-dissolve to the live-action section of the commercial. The projection time from the start of Scene 1 to the middle of the cross-dissolve to the live action is exactly 16 seconds.



Opaqued cels from Scene 2. The first cel has been placed over the background.



16



Immediately below frame 229 of exposure sheet #3, a heavy line has been drawn across the page. This indicates a cut and the beginning of a new scene. This new scene, Scene 2, is a continuation of the action in the preceding scene.

Scene 2 is a *close-up*: a scene that is shot so that the subject matter appears in an unusually close relationship to the camera. For instance, a normal camera shot of an actor might show his complete figure, but a close-up shot of the same actor would show only the head, hands or some other area to be emphasized.

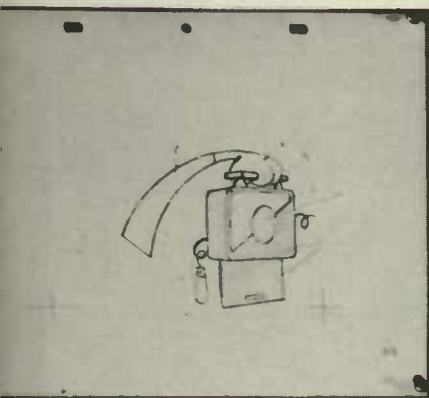
The still background for this scene is a solid color or tone matching the color of the buildings in the pan background used in Scene 1.

Scene 2 begins with frame 230. The animation again uses three cel levels.

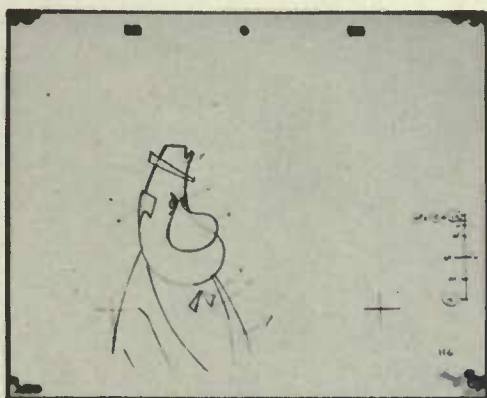
PROG. NO.	CLIENT	PICTURE NAME	NO.	SCENE	FOOTAGE	SHEET NO.	NO. SHEETS		
5847	GE. RADIO	MR. WIMPLE		2		3	6		
SYNOPSIS:		(OPENING)		ANIMATION STAND NO.					
ANIMATOR:									
ASSISTANT:									
DIAL	TRACK	ACTION	DIAL	DESK	1	2	3	4	DIAL
			110						110
			111						111
			112						112
			113						113
			114						114
			115						115
			116						116
			117						117
			118						118
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			285						285
			286						286
			287						287
			288						288

The first drawing, 115, in column 2, the cel level nearest the background, has the hand, arm and radio in a static pose similar to that shown in drawing 114, the last drawing used in Scene 1. Drawing 116, exposed in column 3, consists of Mr. Wimple's head and body. Beginning with drawing 117, the third or top level has the mouth actions for the dialogue which opens the scene. Mr. Wimple is saying, "And just when I need a radio most." This arrangement of cel levels continues to frame 253. At that point, all three levels are combined on one cel, drawing 126, and two blank cels are exposed in order to keep the color density of the scene consistent.

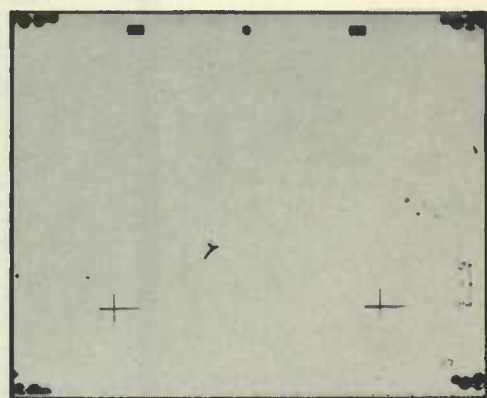
In the sequence of action beginning with drawing 126, a good example of anticipation is shown. The expression on Mr. Wimple's face helps support the animated action that follows.



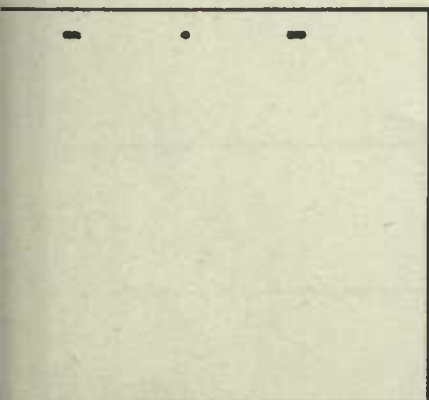
115, drawing for hold cel.



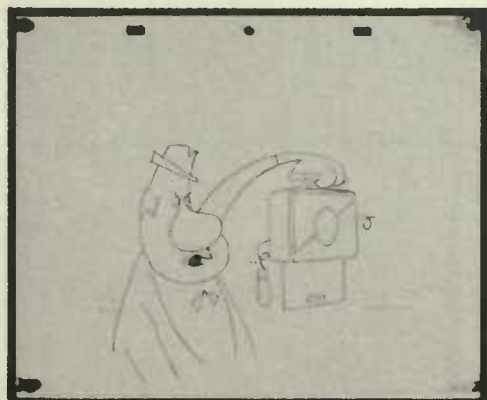
116, drawing for hold cel.



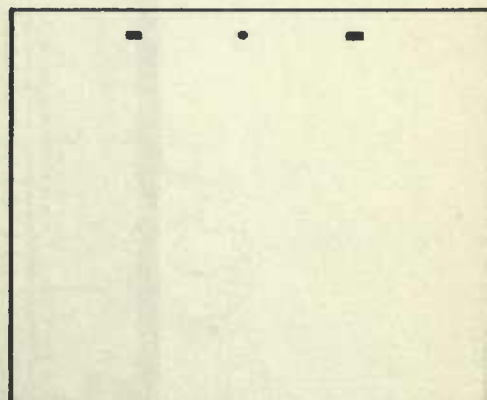
117, drawing for mouth action.



Blank cel.



126, drawing for action cel.



Blank cel.

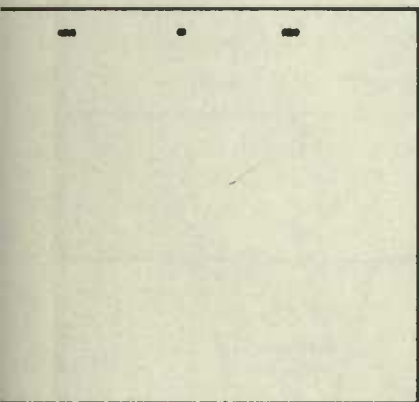
PROD. NO.		CLIP	PICTURE NAME	NO.	SCENE	FOOTAGE	SHEET NO.	NO. SHEETS																										
5897		GE. RADIO	MR. WIMPLE	2	4	5																												
STORY:		(OPENING)			ANIMATION STAFF NO.																													
ANIMATOR:																																		
ASSISTANT:																																		
DIAL	THRU	ACTION	DIAL	REMARKS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	1		1	125																														
2	2		2	126																														
3	3		3	127																														
4	4		4	128																														
5	5		5	129																														
6	6		6	130																														
7	7		7	131																														
8	8		8	132																														
9	9		9	133																														
10	10		10	134																														
11	11		11	135																														
12	12		12	136																														
13	13		13	137																														
14	14		14	138																														
15	15		15	139																														
16	16		16	140																														
17	17		17	141																														
18	18		18	142																														
19	19		19	143																														
20	20		20	144																														
21	21		21	145																														
22	22		22	146																														
23	23		23	147																														
24	24		24	148																														
25	25		25	149																														
26	26		26	150																														
27	27		27	151																														
28	28		28	152																														
29	29		29	153																														
30	30		30	154																														
31	31		31	155																														
32	32		32	156																														
33	33		33	157																														
34	34		34	158																														
35	35		35	159																														

At frame 275, there is another hold cel, drawing 137. It was made in order to avoid additional retracing and opaquing. Mr. Wimple's mouth actions are drawn and exposed on a separate level.

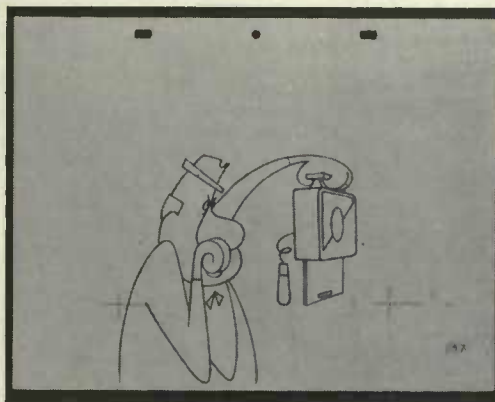
The word "most," ending the dialogue, is spoken as the anticipation builds up to the accent. The climax is reached with the sound effect of the crash, which is synchronized with the animation so that it is heard at the point when Mr. Wimple's fist smashes into the radio.

Because of the comparatively violent action of the smashing of the radio, all cel levels have been combined, starting with drawing 142. The animated effects beginning on drawing 148 and continuing through drawing 152 help emphasize the main action and are very important to the animation. The facial expressions and poses in the drawings used before and after the violent action also help lend reality to the animated sequence. The vigorous manner in which Mr. Wimple says "Phooey!" not only ends the dialogue in the scene but causes his hat to bounce off his head, as shown in drawings 157 to 166. Although this hat action was not indicated in the story board, the animator added it to emphasize the sound effect of the Bronx cheer which accompanied the word "Phooey."

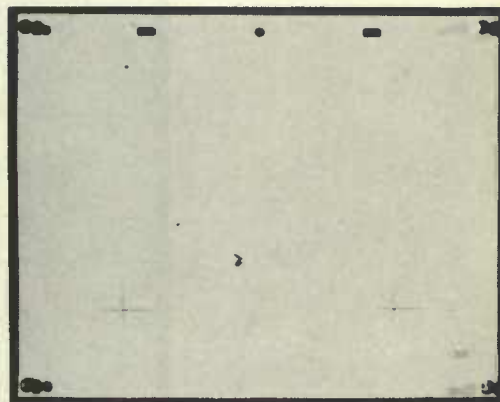
Little auxiliary actions, such as the hat's bounce have almost the same effect in animation as facial expressions and hand gestures. They help accent and emphasize other actions which otherwise might be dull and routine.



Blank cel



137, drawing for hold cel.



138, drawing for action cel.



PROD. NO.	CLIENT	PICTURE NAME	NO.	SCENE	FOOTAGE	SHEET NO.	TOTAL SHEETS
5897	G.C. RADIO	MR WYNNE		2		5	5

STORY:
 ANNOTATION:
 ASSISTANT:

(OPENING)

ANIMATION STAND NO.

DIAL	TRUNK	ACTION	DIAL	DECK	1	2	3	4	DIAL	FILM	R.P.C.
1			1						1		
2			2						2		
3			3						3		
4			4						4		
5			5						5		
6			6						6		
7			7						7		
8			8						8		
9			9						9		
0			0						0		
1			1						1		
2			2						2		
3			3						3		
4			4						4		
5			5						5		
6			6						6		
7			7						7		
8			8						8		
9			9						9		
0			0						0		
1			1						1		
2			2						2		
3			3						3		
4			4						4		
5			5						5		
6			6						6		
7			7						7		
8			8						8		
9			9						9		
0			0						0		
1			1						1		
2			2						2		
3			3						3		
4			4						4		
5			5						5		
6			6						6		
7			7						7		
8			8						8		
9			9						9		
0			0						0		
1			1						1		
2			2						2		
3			3						3		
4			4						4		
5			5						5		
6			6						6		
7			7						7		
8			8						8		
9			9						9		
0			0						0		
1			1						1		
2			2						2		
3			3						3		
4			4						4		
5			5						5		
6			6						6		
7			7						7		
8			8						8		
9			9						9		
0			0						0		
1			1						1		
2			2						2		
3			3						3		
4			4						4		
5			5								

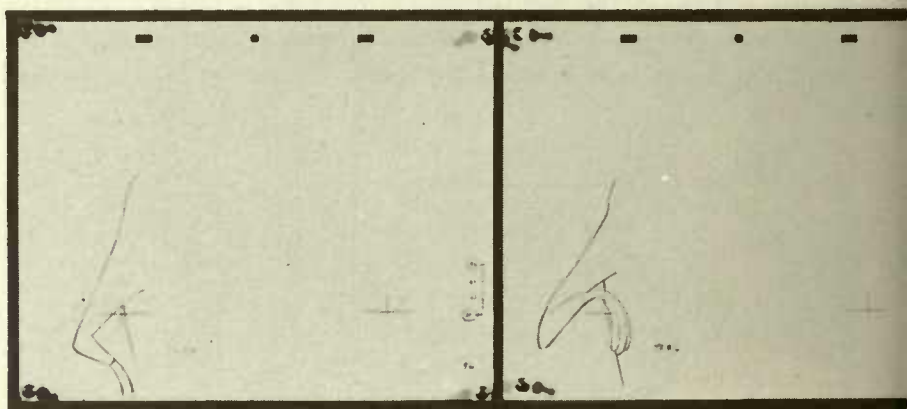
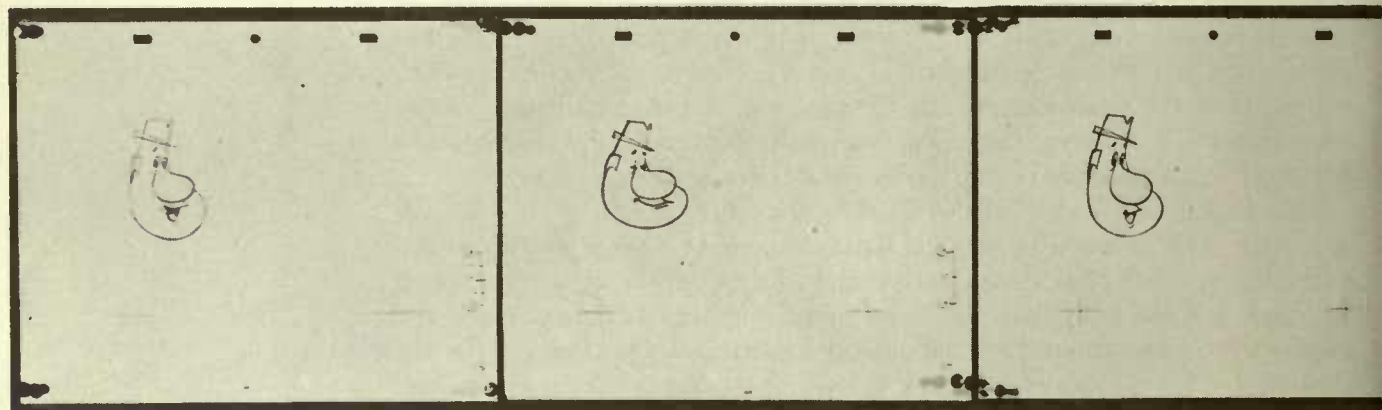
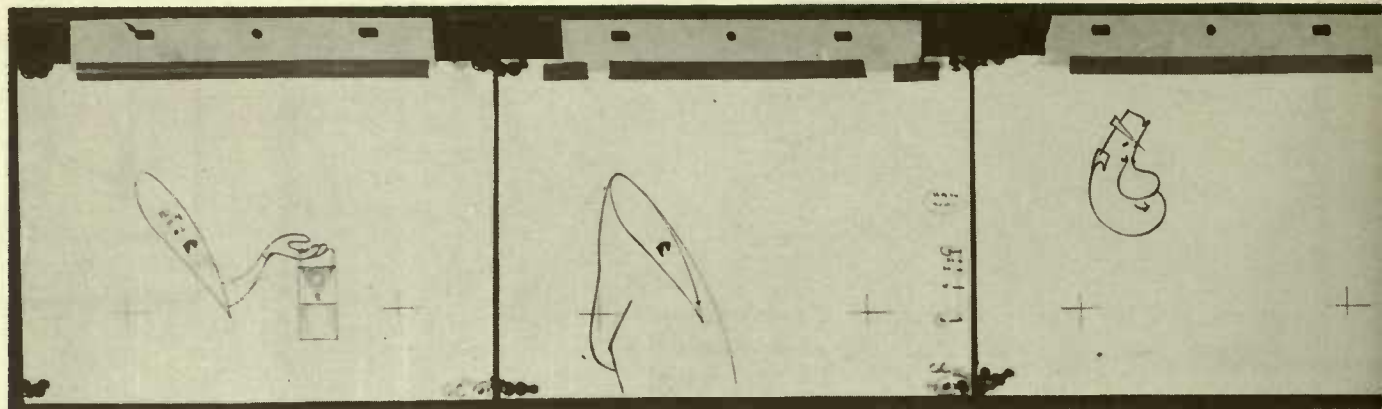


At frame 369 on exposure sheet #5, a cross-dissolve to the live-action part of the commercial is indicated. The cross-dissolve to live is written on the exposure sheet by the animator as a direction to the animation cameraman. In this case, the cross-dissolve does not require any drawing or additional work by either the animator or the animation cameraman, since the animated scene ends with Mr. Wimple in a static pose. The animation cameraman will simply photograph the hold-position cel for the number of frames in the cross-dissolve. If, for example, the desired length of the cross-dissolve is one foot, the cameraman will photograph the hold position for 16 frames. A two-foot cross-dissolve would require 32 frames.

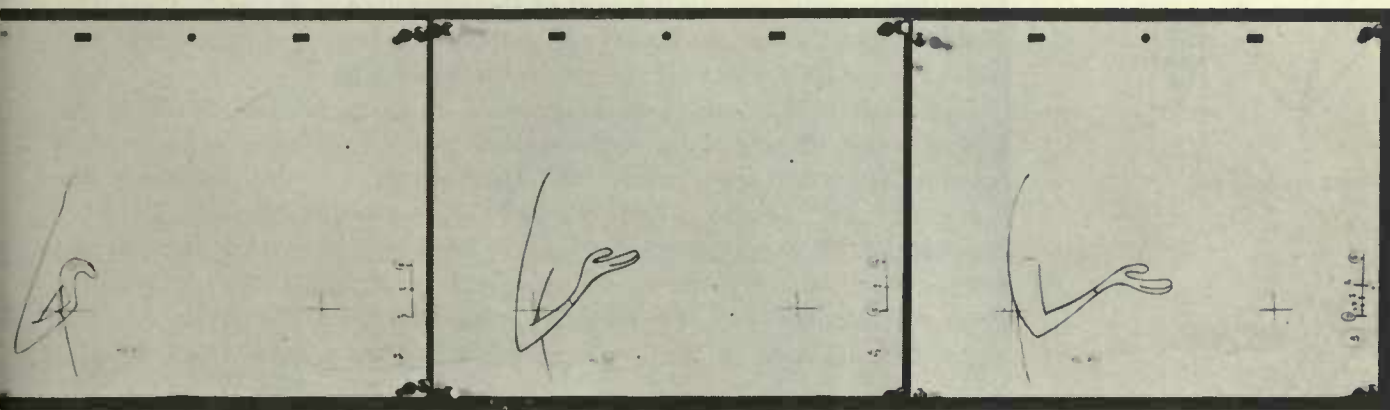
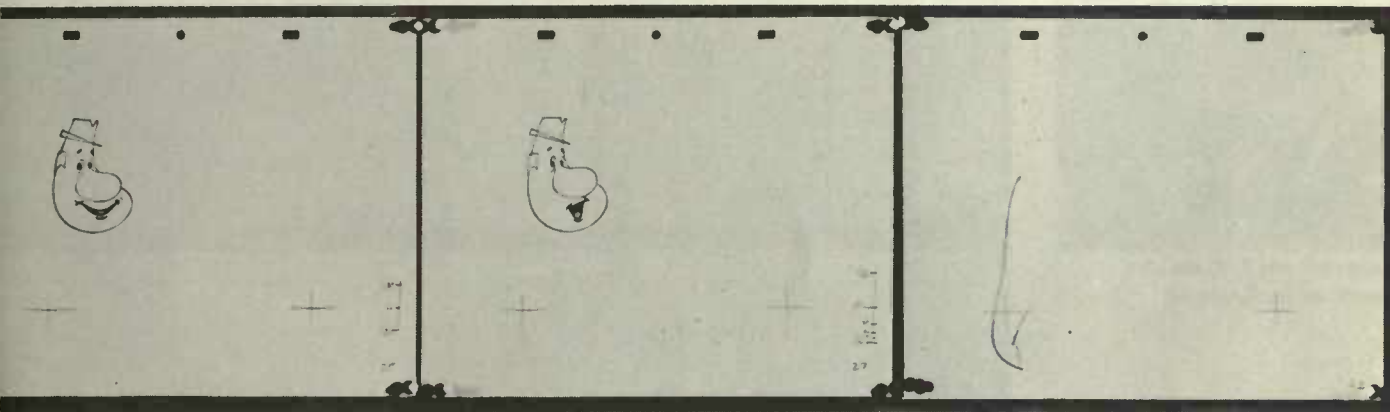
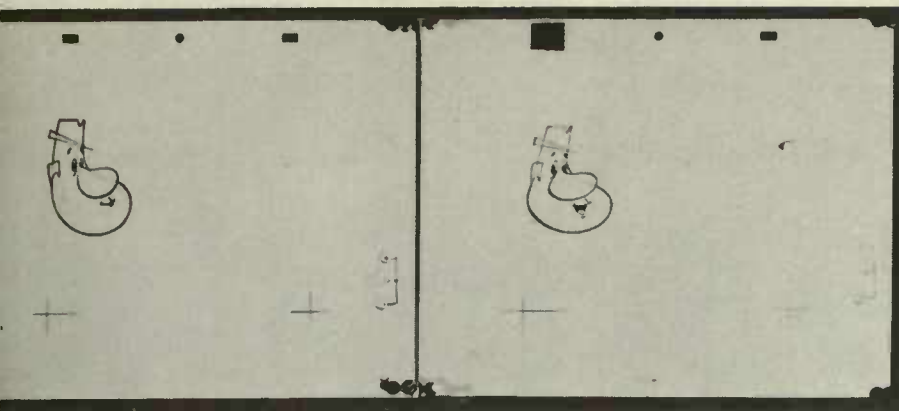
The cross-dissolve itself will be done by the optical cameraman, who will first copy the film made by the animation cameraman. Then starting at the exact frame where the cross-dissolve is to begin, the optical cameraman will fade out the animation in the required number of frames. When the fade-out has been completed, the optical cameraman will then reverse the direction of the camera and go back to the frame where the fade-out began. He will complete the cross-dissolve by fading in the live-action scene over the same portion of the film containing the fade-out of the animation. This method of overlapping two scenes is one of the most widely used effects in motion pictures, both live and animated.

*Last drawing of Scene 2
held for cross-dissolve.*





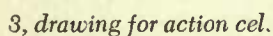
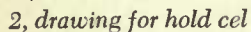
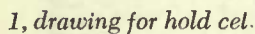
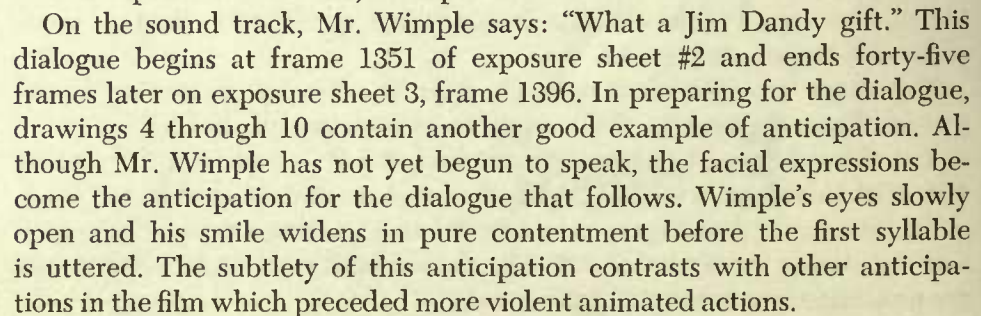
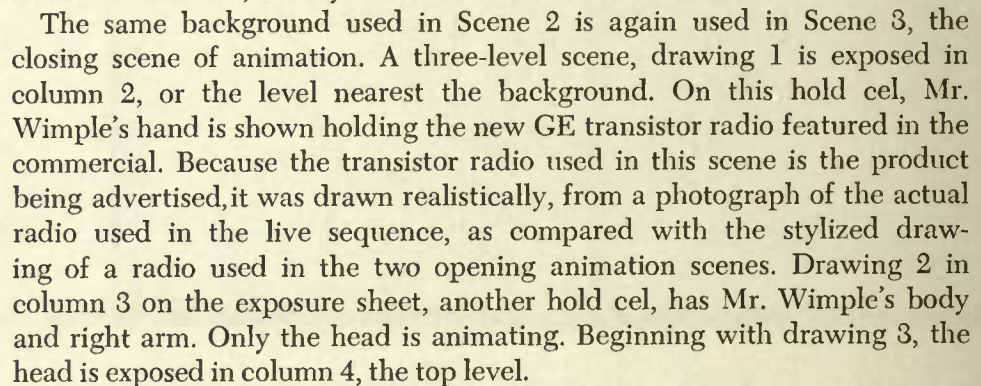
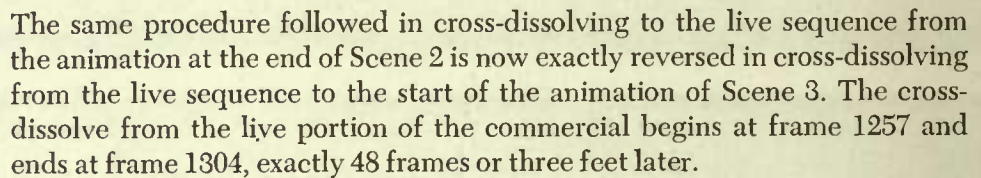
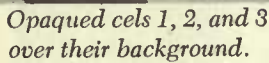
Scene 3



Shown here are all of the extreme drawings that were used in the final scene of the one-minute commercial.

This scene cross-dissolves optically from the live-action portion of the picture. From the middle of the cross-dissolve ending the live action to the end of the commercial, the projection time is $6 \frac{2}{3}$ seconds. For this closing 10 feet of animation, a total of 52 drawings was needed, 14 of them extremes.

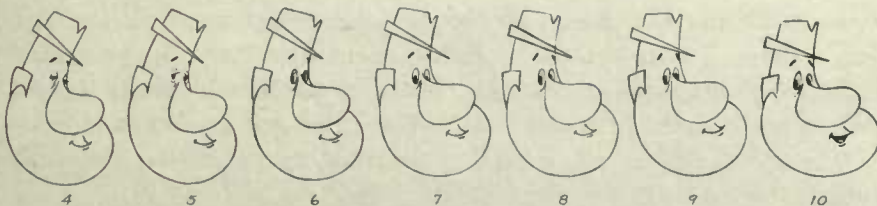
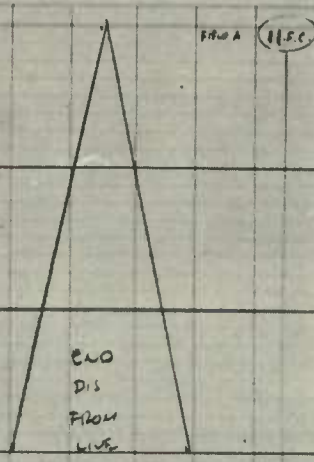
The number of drawings required for the two opening scenes of animation and the closing scene totaled 226. The three scenes used 34 feet of film and the projection time totaled $22 \frac{2}{3}$ seconds.



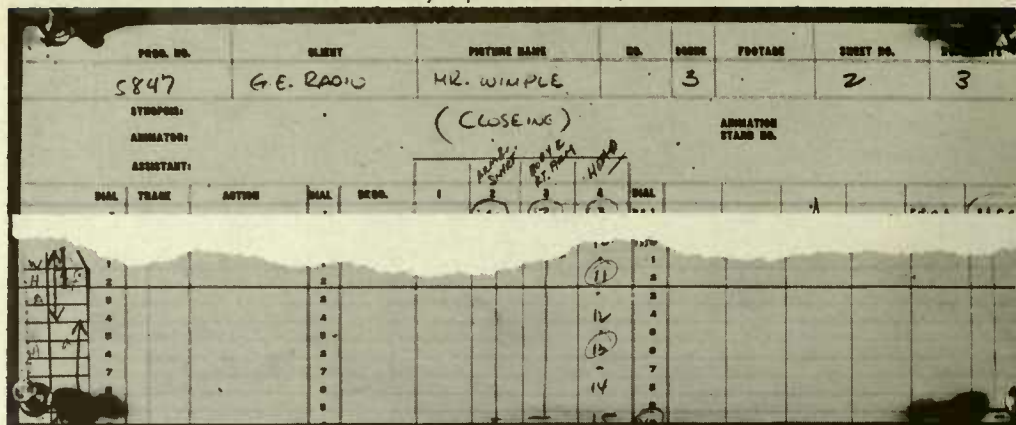
PROD. NO.	CLIENT	PICTURE NAME	NO.	SCENE	FOOTAGE	SHEET NO.	REVISIONS
5847	G. E. RAOUL	MR. WIMPLE		3		2	3
SYNOPSIS: ANIMATOR: ASSISTANT:							
(CLOSING)							
ANIMATION STAND NO.							
DIAL	TRACK	ACTION	DIAL	DEPT.	1	2	3
1			1				
2			2				
3			3				
4			4				
5			5				
6			6				
7			7				
8			8				
9			9				
10			10				
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100			100				



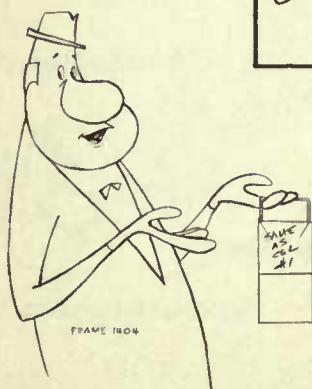
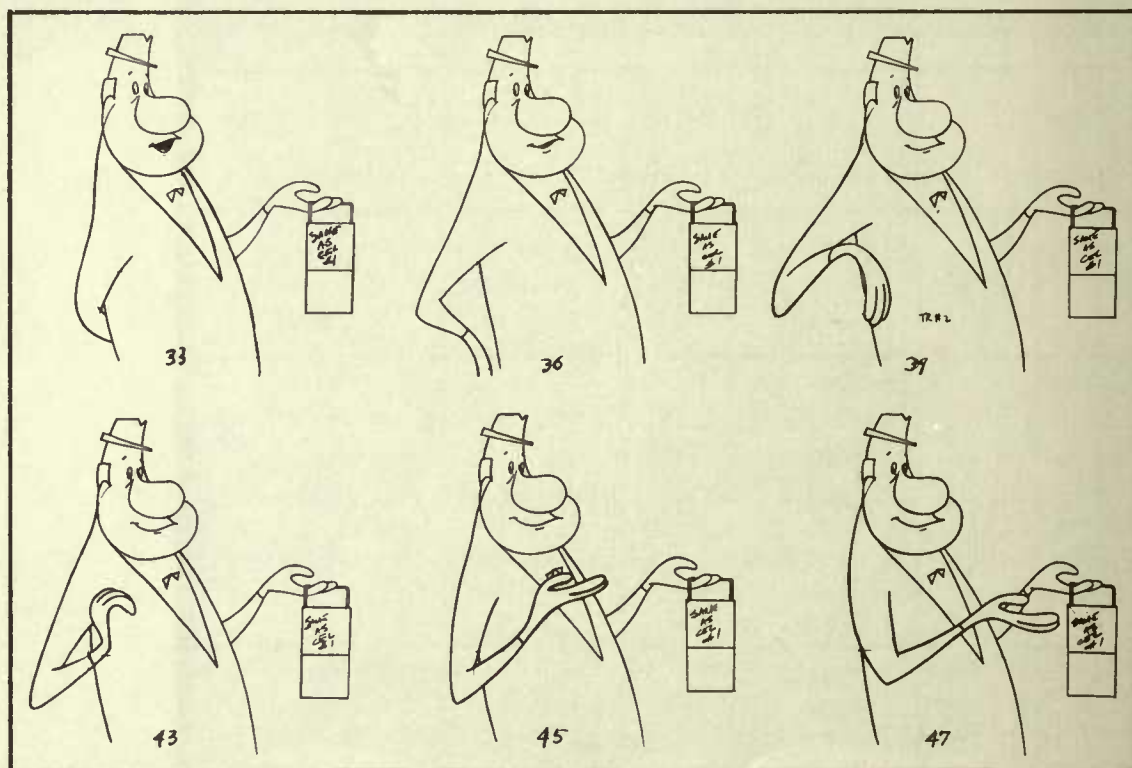
21



Anticipation series.



At drawing 11, Mr. Wimple begins to speak. His right hand, motionless during the anticipation and at the start of the dialogue, begins animating at frame 1365, drawing 33. These hand gestures help emphasize Mr. Wimple's dialogue. At frame 1404, after the dialogue has ended, Mr. Wimple goes into a static pose which he holds for the balance of the scene.



At frame 1440, the last frame of the one-minute commercial, the animator has written a note on the exposure sheet directing the animation cameraman to photograph forty-eight frames or three additional feet of film of Mr. Wimple in the final static pose. This is what is known as *bumper* footage. It is added to the end of each commercial as a standard operating procedure.

Exposure sheet 3, Scene 3.



PROD. NO.		CLIENT	PICTURE NAME	NO.	SCENE	FOOTAGE	SHEET NO.	NO. SHEETS	
5847.		GE. RADIO	MR. WIMPLE		3		3	3	
STORYBOARD:		(CLOSE UP)			ANIMATION STAND NO.				
ANIMATOR:									
ASSISTANT:									
DIAL	THANK	ACTION	DIAL	DECD.	1	2	3	4	DIAL
1						1	2	16	16.1
2								17	17.1
3								18	18.1
4								19	19.1
5								20	20.1
6								21	21.1
7								22	22.1
8								23	23.1
9								24	24.1
10								25	25.1
11								26	26.1
12								27	27.1
13								28	28.1
14								29	29.1
15								30	30.1
16								31	31.1
17								32	32.1
18								33	33.1
19								34	34.1
20								35	35.1
21								36	36.1
22								37	37.1
23								38	38.1
24								39	39.1
25								40	40.1
26								41	41.1
27								42	42.1
28								43	43.1
29								44	44.1
30								45	45.1
31								46	46.1
32								47	47.1
33								48	48.1
34								49	49.1
35								50	50.1
36								51	51.1
37								52	52.1
38								53	53.1
39								54	54.1
40								55	55.1
41								56	56.1
42								57	57.1
43								58	58.1
44								59	59.1
45								60	60.1
46								61	61.1
47								62	62.1
48								63	63.1
49								64	64.1
50								65	65.1
51								66	66.1
52								67	67.1
53								68	68.1
54								69	69.1
55								70	70.1
56								71	71.1
57								72	72.1
58								73	73.1
59								74	74.1
60								75	75.1
61								76	76.1
62								77	77.1
63								78	78.1
64								79	79.1
65								80	80.1
66								81	81.1
67								82	82.1
68								83	83.1
69								84	84.1
70								85	85.1
71								86	86.1
72								87	87.1
73								88	88.1
74								89	89.1
75								90	90.1
76								91	91.1
77								92	92.1
78								93	93.1
79								94	94.1
80								95	95.1
81								96	96.1
82								97	97.1
83								98	98.1
84								99	99.1
85								100	100.1

HOLD 3RD EXTRA
TO DIAL # 1488





123

In Conclusion...

So ends the production of an animated cartoon. The film has been “canned,” the camera lights have been turned down, and the production crew has dispersed for a deserved rest following a job well done.

In the morning, the processed film will be screened. Anxious eyes will critically scan the projected film and an audible sigh of relief will accompany the smiles of the artists as they make their way back to their various departments, ready to tackle the next script and story board.

The combined talents of approximately fifty people were needed to produce the General Electric animated commercial discussed in these pages. This total does not include the crew and actors necessary for the live-action sequences or the lab personnel who processed the film. Neither does it include the group of technicians present at the sound-recording session or other “behind-the-scenes” personnel.

I bow to all of the talented and dedicated people in the animation industry in this country and throughout the world. Many of them have helped make my twenty-eight years in animation seem like a very short period of time. To them, I can only say, “thanks” and “keep those pencils sharpened and those cameras rolling.”



Appendix

Glossary of Terms

The following list of definitions and abbreviations is accepted by all animation studios, both theatrical and commercial.

ABBREVIATION	TERM	DEFINITION
Act.	Action	The series of events and movements that make up an animated film.
Anim.	Animation	The preparation of animated cartoons.
	Animation Board	A standard drawing board with minor adaptations for the needs of animation.
	Answer Print	<i>See Optical Print</i>
	Anticipation	A preparatory action leading up to an accented pose. Its purpose is to give added emphasis to the accent.
App.	Approach (also Truck, Dolly or Zoom)	The movement of a camera from a long shot of a scene to a close-up of the same scene, or vice versa.
Bkgd.	Background	The part of a scene farthest from the camera. Also, the scenery or ground against which the drawings are photographed.
	Bar Sheets (also Lead Sheets)	A complete record of a film in terms of single frames. The sheets show the exact length of each syllable of each word for the portion of the film to be animated.
Bt.	Beat	The musical tempo used for timing or synchronizing sound.
B. P.	Bottom Pegs	The lower set of pegs on an animation board or camera compound table used for registering drawings, cels or backgrounds.
Brk. Dwn.	Break Down	A notation placed on drawings when an animator has been working loosely, leaving wide spaces between his extremes. The notation, Brk. Dwn., tells an assistant that he should make any intermediate drawings needed before the inbetweeners can go to work.
	Bumper Footage	Extra footage of the opening or final shot of a film, which is added as standard procedure.
Cam.	Camera (Animation)	A motion-picture camera with special adjustments for the needs of animation.

ABBREVIATION	TERM	DEFINITION
	Cel	A sheet of transparent celluloid or acetate on which the lines of a drawing are traced. The sheet is the same size as the animation drawing paper; it is .005 inch thick and punched to fit over the registration pegs on an animation board.
	Cel Level	The number of separate drawings or cels placed one over the other and photographed at the same time.
C. U.	Close-Up (also Close Shot)	A scene or action photographed from such a short distance that only a small part of the subject fills a frame of film. A close-up of an actor might show his head or, perhaps, only his eyes or mouth.
Col.	Colorer	See <i>Opaquer</i>
	Color Model	See <i>Model Drawing</i>
C. D.	Complete Drawing	A notation placed on a drawing when an animator has only drawn the part of a cartoon character that is animating. The notation, C. D., tells his assistant that he should complete the drawing.
Comp. Print	Composite Print	A print that has both the picture portion and the sound track combined on one piece of film.
	Cross-Dissolve (also X-Dissolve)	An optical or camera effect in which one scene fades out and another fades in over the same frames of film.
	Cut	The direct, abrupt end of a scene or action.
	Dailies (also Rushes)	The rough prints of the previous day's live shooting from which the best takes will be selected.
Diag.	Diagonal	Used to describe a pan background move or a camera angle.
Dial.	Dialogue	The speech recorded on the sound track.
DX	Double Exposure	Two exposures on the same frame of film.
Dwg.	Drawing	The picture of a cartoon character or object.
	Expose	This term has two meanings: 1) the process of photographing, that is, a cameraman <i>exposes</i> a frame of film; 2) the listing of the animation drawings in their proper sequence on the exposure sheets.
	Exposure Sheets (also X Sheets)	A record of every frame of animation. The sheets include a description of the sound track and the order in which each cel is to be photographed, as well as background notes and camera instructions.



ABBREVIATION	TERM	DEFINITION
	Extremes	The key drawings of an action or scene made by an animator. They do not show the entire action, but are sufficient to guide the inbetweener who will make the balance of the drawings for the scene.
	Fade	An optical or camera effect in which each successive frame of film receives progressively less exposure until the final frame of the scene is completely black. Also, the fading in of a scene from black or the fading out to black.
F.	Field, Field Size	The size of the area to be photographed. The abbreviation is usually preceded by a number to indicate the actual field size. For example, 9 F. would indicate a shooting area measuring 9 inches horizontally.
Fin.	Final	The last. The last shot of a scene or film.
	Fine Grain	The live action or animation film that is copied by the optical cameraman.
Fol.	Follows	To go or come after in natural sequence.
Ft.	Foot, Feet	A standard linear measurement used for measuring film.
Ftg.	Footage	A length of film.
Forgnd.	Foreground	The part of a scene nearest to the camera.
Fr.	Frame (also X)	A single exposure or picture on a strip of film.
	Hit	The exact moment of accent.
H	Hold	Used to indicate a stop position for drawings or pan backgrounds when they are being photographed.
	Hold Cel	A cel that is held still for several frames during some portion of an animated sequence.
H. U.	Hook Up	Used to indicate that the first and last drawings of an action are the same and interchangeable. It is usually used in walk sequences or other repeat actions to establish the cycle.
Inb.	Inbetween (Drawings)	The drawings that come in between an animator's extreme drawings.
Inbtr.	Inbetweener	The artist who makes the inbetween drawings.
In. or "	Inch, Inches	A standard linear measurement used for marking moves on background pans.

ABBREVIATION	TERM	DEFINITION
	Inker	The artist who traces drawings on cels.
	Inking	The process of transferring an animator's drawings to cels.
	Interlock	The process whereby the picture reel and the sound track reel are run at the same time for the purpose of checking their temporary synchronization.
	Lap Dissolve	The same as a cross-dissolve. "Lap" is the abbreviation for overlapping.
	Lead Sheets	See <i>Bar Sheets</i>
L.	Left	Used to indicate the direction of movement of an animated action or pan background.
Lip Sync.	Lip Synchronization	The animation of mouth actions to fit the dialogue recorded on the sound track.
	Live Action	A complete film or sequences of a film in which live actors or real objects are photographed instead of drawings. An animated commercial often has sections of live action.
L. S.	Long Shot (also Establishing Shot)	A scene or action photographed from a distance so that a large area of the setting appears on a frame of film, and individual actors or objects appear quite small. The opposite of a close-up.
M.	Match	Used to indicate that a drawing or cel should be fitted to another drawing or to an object or prop on the background.
Med. Shot	Medium Shot	A scene that is photographed from a medium distance so that the full figure of an actor or cartoon character fills an entire frame. It is between a close-up and a long shot.
Mod.	Model, Model Drawing (also Color Model)	A drawing that is marked with numbers to indicate the colors to be used by the opaquer.
	Mood Music	Background music that establishes a mood and accompanies the action.
	Moviola	A mechanism used by a film editor in synchronizing the visual reel of a film with the sound track.
O. R.	Off Register	Used to indicate off-center positioning and certain effects in photography such as vibrations.
	Ones, Twos or Threes	The number of frames on which a cel is to be photographed.



ABBREVIATION	TERM	DEFINITION
	Opaquer (also Colorer)	An artist who colors the cels.
	Opaquing	The coloring of cels with opaque water colors.
	Optical Print (also Answer Print)	The first combination of animation and live action. It is used for checking the continuity of the filmed picture with the story board and for checking the temporary synchronization of the picture and the sound track.
Opt. Printer	Optical Printer	A mechanism similar to two coupled cameras. As its name implies, its basic function is to optically print or copy film. It is also used to achieve photographic effects such as fades, cross-dissolves, flips and repeats.
O-lay	Overlay	Usually a part of a background or prop that goes over the cartoon characters when the scene is being photographed. It is used to create the illusion of greater depth in a scene.
	Pan	The movement of a scene or background during the photographic process.
	Pan Background	A background that moves during the photographic process. It may move vertically, horizontally or diagonally.
P. T.	Pencil Test	A test in which the drawings are photographed instead of the finished cels in order to find where corrections are needed before the scene is inked and opaqued.
Pos.	Position	The registration of drawings, cels or backgrounds in relation to normal center pegs.
Post Sync.	Post Synchronized	The recording of the sound track after animation has been completed.
Pre Sync.	Pre Synchronized	The recording of the sound track before any animation production has begun.
Prod.	Production	The process of making an animated film. Also, the complete work.
	Raw Stock	Unexposed film.
	Reel	A metal or plastic spool upon which film is wound for use in projectors and moviolas.
Reg.	Register, Registry	The positioning of a drawing, cel or background on the pegs of an animation board so that all work is perfectly aligned.
	Release Print	The final composite print that is released to TV stations or theaters.

ABBREVIATION	TERM	DEFINITION
Rpt.	Repeat	Used to indicate that an action is to be repeated for more than its original number of frames, for example in the repeat cycle of a walk.
Rev.	Reverse	Used to indicate a change of direction for a pan background or an action. Also, an instruction to the optical cameraman to reverse the direction of the film.
R.	Right	Used to indicate the direction of movement of a pan background or an animated character.
	Rough Cut	The first combination of various shots and scenes to be used in a completed film.
	Rushes	See <i>Dailies</i>
Sc.	Scene	A part of a film in which there is no change of place and which presents a single situation or dialogue. Also the place where the action is laid.
Scq.	Sequence	Several actions or scenes from a production.
Sh.	Sheet	See <i>Exposure Sheet</i>
S. E.	Sound Effect	A special effect on the sound track, such as the sound of an object dropping or a door closing.
	Sound Reader	A mechanism used by a film editor in analyzing a sound track for animation purposes.
	Sound Track	The recorded dialogue and background sound on tape. Also, the edge of a film frame where the sound impulses appear.
	Squash	The exaggeration of a cartoon character or object through flattening or compression.
S. F.	Standard Field	The standard shooting area. This varies among animation studios. In most, the standard field is either the 11 field or the 12 field (12 inches horizontal measurement).
	Still Background	A background that remains in a fixed position during an entire scene.
	Stop Motion	The adjustment of a camera so that it can photograph one frame of film at a time.
	Story Board	A series of drawings arranged like the panels of a comic strip to show the sequence of a plot.
	Stretch	The exaggeration of a cartoon character or object through elongation.



ABBREVIATION	TERM	DEFINITION
Sync.	Synchronize, Synchronization	The positioning of a sound track so that it is in harmony and timed to the picture portion of the film.
	Synchronizer	A mechanism used by a film editor to measure the exact film length of each work and musical phrase on a sound track. It is usually used in conjunction with a sound reader.
	Table Top	The movable working area of an animation stand on which the art work to be photographed is placed.
T.	Take	This term has several meanings: 1) a reaction indicating surprise, used for added effect; 2) photographing an action, or the film that records the action.
	Tap	The breakdown of a musical beat.
T. P.	Top Pegs	The upper set of pegs on an animation board or camera compound table used for registering drawings, cels or backgrounds.
T. B.	Trace Back	A note on a drawing to an inker to trace a portion of a drawing other than the one he is working on.
	Twos	Two exposures or frames for each cel. See <i>Ones, Twos or Threes</i> .
Vert.	Vertical	Used to indicate the direction of movement of a pan background.
	Wipe	An optical effect similar to the action of a window shade. It is used to take one scene out and introduce another over the same piece of film.
	Work Print	The print used during production. Both the visual portion and the sound track of various scenes are cut to the actual lengths to be used in the finished production.
	X	See <i>Frame</i>
X-Diss.	X-Dissolve	See <i>Cross-Dissolve</i>
	X Sheets	See <i>Exposure Sheets</i>
	Zoom	See <i>Approach</i>

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